U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science Directorate
Geologic Resources Division

Blue Ridge Parkway (Northern or Virginia portion of Parkway Bedrock Map)

GRI Ancillary Map Information Document

Produced to accompany the Geologic Resources Inventory (GRI) Digital Geologic Data for Blue Ridge Parkway

blrn_geology.pdf

Version: 9/16/2015

Geologic Resources Inventory Ancillary Map Information Document for Blue Ridge Parkway (Northern or Virginia portion of Parkway Bedrock Map)

Table of Contents

Geologic Resources Inventory Map Document 1
About the NPS Geologic Resources Inventory Program 2
GRI Digital Map and Source Map Citation 4
Map Unit List 5
Map Unit Descriptions 7
Jd - Diabase (Early Jurassic) 7
PZmy - Mylonite (Paleozoic) 7
Omb - Martinsburg Formation (Upper and Middle Ordovician) 7
OCco - Conococheague Formation (Lower Ordovician and Upper Cambrian) 8
Ce - Elbrook Formation (Upper and Middle Cambrian) 8
Cw - Waynesboro Formation (Middle and Lower Cambrian) 8
Cs - Shady Dolomite (Middle and Lower Cambrian) 8
Ccq - Quartz tectonite (Lower Cambrian) 8
Cca - Antietam Formation (Lower Cambrian) 8
Cce - Erwin Formation (Lower Cambrian) 9
Cch - Hampton - Harpers formations, undivided (Lower Cambrian) 9
Cchq - Hampton - Harpers formations, orthoquartzite (Lower Cambrian) 9
Ccw - Weverton Formation (Lower Cambrian) 10
CZcu - Unicoi Formation (Lower Cambrian and Neoproterozoic?) 10
CZcl - Lower Chilhowee Group, undivided (Lower Cambrian and Neoproterozoic?) 11
PZZabg - Alligator Back Formation, layered biottite-muscovite gneiss (Early Paleozoic and Neoproterozoic) 11
PZZabs - Alligator Back Formation, garnet-biotite-muscovite-quartz schist (Early Paleozoic and Neoproterozoic) 11
PZZabl - Alligator Back Formation, laminated amphibolite gneiss (Early Paleozoic and Neoproterozoic) 12
PZZabq - Alligator Back Formation, quartz and quartz-rich metasandstone (Early Paleozoic and Neoproterozoic) 12
PZZabm - Alligator Back Formation, marble (Early Paleozoic and Neoproterozoic) 13
PZZum - Altered ultramafic and ultrabasic rocks (Early Paleozoic and Neoproterozoic) 13
CZmg - Muscovite-biotite metagraywacke (Cambrian and Neoproterozoic) 13
CZms - Graphite-muscovite-quartz metasandstone (Cambrian and Neoproterozoic) 13
CZgs - Graphitic schist (Cambrian and Neoproterozoic) 14
CZamb - Lynchburg Group, biotite-bearing amphibolite (Cambrian and Neoproterozoic) 14
CZamc - Lynchburg Group, clinozoisite-bearing amphibolite (Cambrian and Neoproterozoic) 14
CZamq - Lynchburg Group, quartz-layered amphibolite (Cambrian and Neoproterozoic) 15
Zacm - Ashe Formation, conglomeratic metagraywacke (Neoproterozoic) 15
Zcb - Catoctin Formation, metabasalt (Neoproterozoic) 15
Zcm - Catoctin Formation, metamudstone and phyllite (Neoproterozoic) 16
Zcs - Catoctin Formation, metasandstone (Neoproterozoic) 16
Zsr - Swift Run Formation (Neoproterozoic) 16
Zdm - Greenstone (Neoproterozoic) 16

Zgm - Metagranitoid (Neoproterozoic) ... 17
Yjn - Noritic jotunite and nelsonite (Mesoproterozoic) ... 17
Yprg - Garnetiferous quartzo-feldspathic gneiss and pegmatite (Mesoproterozoic) ... 17
Ypom - Peaks of Otter metagranitoid (Mesoproterozoic) ... 17
Yqfm - Quartz-feldspar leucocratic metagranitoid (Mesoproterozoic) ... 18
Yvm - Vesuvius megaporphyritic metagranitoid (Mesoproterozoic) ... 18
Ygdm - Metagranodioritoid (Mesoproterozoic) ... 18
Ygpm - Mesocratic porphyritic metagranitoid (Mesoproterozoic) ... 18
Ypgm - Megacrystic metagranitoid (Mesoproterozoic) ... 19
Ymgm - Massive metagranitoid (Mesoproterozoic) ... 19
Yqm - Megacrystic alkali-feldspar metagranitoid (Mesoproterozoic) ... 19
Ygg - Megacrystic granodioritic gneiss (Mesoproterozoic) ... 19
Yllg - Leucogranitic gneiss (Mesoproterozoic) ... 20
Ydg - Dioritic gneiss (Mesoproterozoic) ... 20
Yplg - Pilot gneiss (Mesoproterozoic) ... 20
Ygtg - Porphyroblastic garnet-biotite leucogranitic gneiss (Mesoproterozoic) ... 20
Yglg - Garnetiferous leucogneiss (Mesoproterozoic) ... 21
Yscg - Sandy Creek Gneiss (Mesoproterozoic) ... 21
Ylgg - Lineated granitoid gneiss (Mesoproterozoic) ... 21
Yg - Granitic gneiss (Mesoproterozoic) ... 21
Yqg - Megacrystic alkali-feldspar gneiss (Mesoproterozoic) ... 21
Ymg - Migmatite gneiss (Mesoproterozoic) ... 22
Ybcm - Bottom Creek Metagranitoid (Mesoproterozoic) ... 22
Ymlg - Biotite-muscovite leucogneiss (Mesoproterozoic) ... 22
Ybgg - Biotite granitic augen gneiss (Mesoproterozoic) ... 22
Ybqg - Blue-quartz gneiss (Mesoproterozoic) ... 23
Yblg - Biotite leucogneiss (Mesoproterozoic) ... 23

Photographs ... 24

AV-2 ... 24
AV-6 ... 24
AV-7 ... 25
AV-8 ... 26
AV-14 ... 27
AV-15 ... 28
AV-16 ... 29
AV-25 ... 30
AV-33 ... 31
AV-34 ... 32
AV-42 ... 33
AV-43 ... 33
AV-49 ... 34
AV-53 ... 35
AV-58 ... 36
BI-7 ... 37
BI-10 ... 38
BI-11 ... 39
BI-14 ... 40
BI-16 ... 41
BI-17 ... 42
BI-31 ... 43
BI-33 ... 44
BI-44 ... 45
BI-49 ... 46
BI-62 ... 47

BI-90 47
BI-98 48
BI-101 49
BI-118 50
BI-119 51
BI-138 52
BI-156 53
BI-164 54
BI-172 55
BI-191 56
BI-275 57
BI-276 58
BI-343 59
BI-395 60
BI-397 61
BI-401 62
BI-402 63
BI-424 64
BI-446 65
BI-457 66
BI-458 67
BI-473 68
BI-492 69
BI-556 70
BI-559 71
BL-37 72
BL-41 73
BL-52 74
BL-83 75
BL-84 76
BL-85 77
BL-89 77
BL-93 78
BL-185 79
BL-213 80
BL-309 81
BL-314 82
BL-316 83
BL-369 83
BL-382 84
BL-392 85
BL-394 86
BL-399 87
BL-413 88
BL-415 89
BL-416 90
BL-418 91
BL-424 92
BL-439 93
BL-719 94
BL-764 95
BL-872 96
BL-901 97
BM-51 98

BM-53 99
BM-55 100
BM-72 101
BM-89 102
BM-104 103
BM-115 104
BV-31 105
BV-52 106
BV-62 107
BV-72 108
BV-77 109
BV-88 110
BV-97 111
BV-122 112
BV-123 113
BV-125 113
BV-134 114
BV-135 115
BV-136 116
BV-139 117
BV-167 118
BV-169 119
BV-212 120
BV-248 121
BV-249 122
BV-260 123
BV-289 124
BV-290 125
BV-292 126
BV-295 127
BV-301 128
BV-307 129
BV-339 130
BV-343 131
BV-368 132
BV-373 133
BV-375 133
BV-381 134
BV-382 135
BV-391 136
BV-424 137
BV-426 138
BV-437 139
BV-438 140
BV-439 141
BV-514 142
BV-515 143
BV-516 144
BV-522 145
BV-525 146
BV-530 147
BV-556 148
BV-573 149
BV-576 150

BV-596 ... 151
BV-621 ... 152
BV-678 ... 153
CB-13 ... 154
CB-17 ... 155
CB-29 ... 156
CB-31 ... 157
CB-35 ... 158
CB-36 ... 159
CB-51 ... 160
CB-52 ... 161
CB-53 ... 162
CB-54 ... 163
CB-69 ... 164
CB-71 ... 165
CB-133 ... 166
CB-136 ... 167
CK-10 ... 168
CL-8 ... 169
CL-26 ... 170
CL-33 ... 171
CL-46 ... 172
CL-47 ... 173
CW-13 ... 174
CW-27 ... 175
CW-36 ... 176
CW-38 ... 177
CW-39 ... 178
CW-41 ... 179
CW-71 ... 180
CW-75 ... 181
CW-81 ... 182
CW-88 ... 183
CW-102 ... 184
CW-115 ... 185
CW-135 ... 186
CW-136 ... 187
CW-138 ... 188
CW-141 ... 189
CW-168 ... 190
CW-169 ... 191
CW-170 ... 192
CW-183 ... 193
CW-198 ... 194
CW-209 ... 195
CW-211 ... 196
CW-212 ... 197
CW-218 ... 198
CW-219 ... 199
CW-221 ... 200
CW-223 ... 201
CW-224 ... 202
CW-225 ... 203
CW-229 ... 204

CW-231 205
CW-286 206
EN-22 207
EN-25 208
EN-67 209
EN-187 210
EN-191 211
EN-235 212
EN-258 213
EN-285 214
EN-286 215
EN-391 216
EN-408 217
EN-416 218
EN-424 219
EN-448 220
EN-462 221
EN-467 222
FD-26 223
FD-36 224
FD-44 225
FD-45 226
FD-48 227
FD-51 227
FD-100 228
FD-132 229
FD-134 230
FG-16 231
FG-18 232
FG-21 233
FG-25 234
FG-32 235
FG-45 236
FG-47 237
FG-49 238
FG-51 239
FG-52 240
FG-54 241
FG-92 242
FG-96 243
FG-219 244
FG-237 245
FG-238 246
FG-242 247
FG-245 248
FG-247 249
FG-257 250
FG-303 251
FG-351 252
FG-478 253
FG-483 254
HD-7 255
HD-8 256
HD-10 257

HD-12 ... 258
HD-14 ... 259
HD-18 ... 260
LB-54 ... 261
LB-91 ... 262
LB-92 ... 263
LB-121 ... 264
LB-125 ... 265
LB-194 ... 266
LB-218 ... 266
LB-226 ... 267
LB-405 ... 268
LB-425 ... 269
LB-434 ... 270
LB-437 ... 271
LF-8 ... 272
LF-18 ... 273
LF-37 ... 274
LF-67 ... 275
LF-154 ... 276
MB-88 ... 277
MB-91 ... 278
MB-95 ... 279
MB-120 ... 280
MB-121 ... 281
MB-134 ... 282
MB-138 ... 283
MB-142 ... 284
MB-166 ... 285
MB-169 ... 286
MB-182 ... 287
MB-236 ... 288
MB-247 ... 289
MB-263 ... 290
MB-305 ... 291
MB-329 ... 292
MB-336 ... 293
MB-338 ... 294
MB-345 ... 295
MB-346 ... 296
MB-380 ... 297
MB-393 ... 298
MB-398 ... 299
MB-399 ... 300
MB-424 ... 301
MB-457 ... 302
MB-465 ... 303
MB-468 ... 304
MB-478 ... 305
MB-505 ... 306
MB-512 ... 307
MB-515 ... 308
MB-519 ... 309
MB-524 ... 310

MB-569 ... 311
MB-575 ... 312
MB-616 ... 313
MB-633 ... 314
MB-663 ... 315
MB-668 ... 316
MB-670 ... 317
MB-682 ... 318
MB-700 ... 319
MB-709 ... 320
MB-710 ... 321
MB-714 ... 322
MB-719 ... 323
MB-750 ... 324
MB-764 ... 325
MB-765 ... 326
MB-778 ... 327
MB-802 ... 328
MB-804 ... 329
MB-815 ... 330
MB-816 ... 331
MB-822 ... 332
MB-824 ... 333
MB-857 ... 334
MB-877 ... 335
MB-891 ... 336
MB-894 ... 337
MB-896 ... 338
MB-915 ... 339
MB-916 ... 340
MB-917 ... 341
MB-926 ... 342
MB-929 ... 343
MB-947 ... 343
MB-948 ... 344
MB-951 ... 344
MB-957 ... 345
MB-969 ... 346
MB-995 ... 347
MB-997 ... 348
MB-1217 ... 349
MB-1223 ... 350
MB-1246 ... 351
MB-1437 ... 352
MB-1440 ... 353
MD-11 ... 354
MD-12 ... 355
MD-15 ... 356
MD-59 ... 357
MD-60 ... 358
MD-101 ... 359
MD-118 ... 360
MD-119 ... 361
MD-120 ... 362

MD-140 ... 363
MD-142 ... 364
MD-148 ... 365
MD-247 ... 366
MD-301 ... 367
MD-344 ... 368
MV-2 ... 369
MV-8 ... 370
MV-57 ... 371
MV-70 ... 372
MV-71 ... 372
MV-74 ... 373
MV-77 ... 374
MV-81 ... 375
MV-87 ... 376
MV-95 ... 377
MV-128 ... 378
MV-139 ... 379
MV-161 ... 379
MV-225 ... 380
MV-236 ... 381
MV-248 ... 382
MV-266 ... 383
MV-275 ... 383
MV-280 ... 384
MV-300 ... 385
MV-301 ... 386
MV-302 ... 387
MV-303 ... 388
MV-304 ... 389
MV-305 ... 390
MV-307 ... 391
MV-308 ... 392
MV-309 ... 393
MV-310 ... 394
MV-313 ... 395
MV-314 ... 396
MV-315 ... 397
MV-316 ... 398
MV-317 ... 399
MV-318 ... 400
MV-320 ... 401
MV-330 ... 402
MV-333 ... 403
MV-337 ... 404
MV-338 ... 405
MV-340 ... 406
PO-5 ... 407
PO-9 ... 408
PO-33 ... 409
PO-63 ... 410
PO-133 ... 410
PO-137 ... 411
PO-147 ... 411

PO-149 ... 412
PO-176 ... 413
PO-195 ... 414
PO-196 ... 415
PO-215 ... 416
PO-266 ... 417
PO-312 ... 418
PO-337 ... 419
PO-370 ... 420
PO-371 ... 421
PO-404 ... 422
PO-405 ... 422
PO-406 ... 423
PO-420 ... 424
PO-460 ... 425
PO-495 ... 426
PO-507 ... 427
PO-541 ... 428
PO-548 ... 428
PO-603 ... 429
PO-612 ... 430
PO-613 ... 431
PO-614 ... 432
PO-616 ... 433
PO-635 ... 434
PO-636 ... 435
PO-637 ... 435
PO-646 ... 436
PO-649 ... 437
PO-651 ... 438
PO-660 ... 439
PO-677 ... 440
PO-713 ... 441
PO-714 ... 442
PO-715 ... 443
PO-716 ... 444
PO-722 ... 445
PO-726 ... 446
SH-22 ... 447
SH-27 ... 448
SH-31 ... 449
SH-32 ... 450
SH-53 ... 451
SH-61 ... 452
SH-73 ... 453
SH-116 ... 454
SH-140 ... 455
SH-156 ... 456
SH-157 ... 457
SH-158 ... 458
SH-162 ... 459
SH-166 ... 460
SH-186 ... 461
SH-195 ... 462

SH-199 ... 463
SH-200 ... 464
SH-201 ... 465
SH-208 ... 466
SH-211 ... 467
SH-212 ... 468
SH-213 ... 469
SN-8 ... 470
SN-9 ... 470
SN-10 ... 471
SN-19 ... 471
SN-22 ... 472
SN-31 ... 473
SN-33 ... 473
SN-40 ... 474
SN-54 ... 475
SN-57 ... 476
SN-66 ... 477
SN-67 ... 478
SN-71 ... 479
SN-84 ... 480
SN-88 ... 481
SN-92 ... 482
SN-95 ... 483
SN-97 ... 483
SN-101 ... 484
SN-104 ... 485
SN-109 ... 486
SN-116 ... 487
SN-123 ... 488
SN-124 ... 489
SN-125 ... 490
SN-126 ... 491
SN-132 ... 492
SN-133 ... 493
SN-134 ... 494
SN-156 ... 495
SN-160 ... 496
SN-188 ... 497
SN-194 ... 498
SN-197 ... 499
SN-249 ... 499
SN-263 ... 500
SN-272 ... 501
SN-279 ... 502
SN-442 ... 503
SN-504 ... 503
SN-526 ... 504
SN-528 ... 505
SN-529 ... 506
SN-538 ... 507
SN-539 ... 508
SN-546 ... 508
SN-547 ... 509

SN-569 ... 510
SN-587 ... 511
SN-626 ... 511
SN-641 ... 512
SN-646 ... 513
SN-653 ... 514
SN-658 ... 515
SV-8 ... 516
SV-40 ... 517
SV-47 ... 518
SV-48 ... 519
SV-67 ... 520
SV-90 ... 521
SV-91 ... 522
SV-129 ... 523
VM-32 ... 524
VM-44 ... 525
VM-45 ... 526
VM-51 ... 527
VM-59 ... 528
VM-61 ... 528
VM-73 ... 529
VM-85 ... 530
VM-86 ... 531
VM-88 ... 531
VM-119 ... 532
VM-127 ... 533
VM-137 ... 534
VM-140 ... 535
VM-145 ... 536
VM-161 ... 537
VM-183 ... 538
VS-20 ... 539
VS-31 ... 539
VS-43 ... 540
VS-48 ... 541
VS-67 ... 542
VS-69 ... 543
VS-101 ... 544
VS-107 ... 545
VS-155 ... 546
VS-158 ... 547
VS-204 ... 548
WE-3 ... 549
WE-10 ... 550
WE-13 ... 551
WL-1 ... 552
WL-6 ... 553
WL-13 ... 554
WL-54 ... 555
WL-73 ... 556
WL-75 ... 556
WL-76 ... 557
WL-78 ... 558

WL-82 ... 558
WL-85 ... 559
WL-86 ... 560
WL-112 ... 561
WL-113 ... 562
WL-115 ... 563
WL-116 ... 564
WL-126 ... 565
WL-567 ... 566
WL-598 ... 567
WL-600 ... 568
WL-602 ... 569
WL-683 ... 570
WL-684 ... 571
WL-685 ... 572
WL-703 ... 573
WL-708 ... 574
WL-711 ... 575
WL-716 ... 576
WL-720 ... 577
WL-722 ... 578
WL-740 ... 579
WL-744 ... 580
WL-747 ... 581
WL-782 ... 582
WL-783 ... 583
WL-817 ... 584
WL-823 ... 585
WL-826 ... 586
WL-830 ... 587
WL-834 ... 588
WL-835 ... 589
WL-863 ... 590
WL-864 ... 591
WL-865 ... 592
WL-866 ... 593
WL-874 ... 594
WL-888 ... 595
WL-892 ... 596
WL-893 ... 597
WL-907 ... 598
WL-912 ... 599
WL-933 ... 600
WL-959 ... 601
WL-967 ... 602
WL-971 ... 603
WL-984 ... 604
WL-989 ... 605
WL-993 ... 606
WS-9 ... 607
WS-10 ... 608
WS-29 ... 609
WS-57 ... 610
WS-67 ... 611

WS-88 ... 612
WS-98 ... 613
WS-100 ... 614
WS-102 ... 615
WS-143 ... 616
WS-144 ... 617
WS-160 ... 618
WS-260 ... 619
WS-291 ... 620
WS-294 ... 621
WS-398 ... 622
WS-400 ... 623
WS-403 ... 624
WS-432 ... 625
WS-465 ... 626
GRI Source Ancillary Map Information ... 627
Blue Ridge Parkway Bedrock North ... 627
Readme (Source Data) ... 627
File Structure ... 627
Summary Information ... 628
Description ... 628
Disclaimer ... 632
Data Sources ... 632
GRI Digital Data Credits ... 639

Geologic Resources Inventory Map Document

Blue Ridge Parkway, Virginia and North Carolina

Document to Accompany Digital Geologic-GIS Data

blrn_geology.pdf

Version: 9/16/2015

This document has been developed to accompany the digital geologic-GIS data developed by the Geologic Resources Inventory (GRI) program for Blue Ridge Parkway, Virginia and North Carolina (BLRI).

Attempts have been made to reproduce all aspects of the original source products, including the geologic units and their descriptions, geologic cross sections, the geologic report, references and all other pertinent images and information contained in the original publication.

National Park Service (NPS) Geologic Resources Inventory (GRI) Program staff have assembled the digital geologic-GIS data that accompanies this document.

For information about the status of GRI digital geologic-GIS data for a park contact:

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About the NPS Geologic Resources Inventory Program

Background

Recognizing the interrelationships between the physical (geology, air, and water) and biological (plants and animals) components of the Earth is vital to understanding, managing, and protecting natural resources. The Geologic Resources Inventory (GRI) helps make this connection by providing information on the role of geology and geologic resource management in parks.

Geologic resources for management consideration include both the processes that act upon the Earth and the features formed as a result of these processes. Geologic processes include: erosion and sedimentation; seismic, volcanic, and geothermal activity; glaciation, rockfalls, landslides, and shoreline change. Geologic features include mountains, canyons, natural arches and bridges, minerals, rocks, fossils, cave and karst systems, beaches, dunes, glaciers, volcanoes, and faults.

The Geologic Resources Inventory aims to raise awareness of geology and the role it plays in the environment, and to provide natural resource managers and staff, park planners, interpreters, researchers, and other NPS personnel with information that can help them make informed management decisions.

The GRI team, working closely with the Colorado State University (CSU) Department of Geosciences and a variety of other partners, provides more than 270 parks with a geologic scoping meeting, digital geologic-GIS map data, and a park-specific geologic report.

Products

Scoping Meetings: These park-specific meetings bring together local geologic experts and park staff to inventory and review available geologic data and discuss geologic resource management issues. A summary document is prepared for each meeting that identifies a plan to provide digital map data for the park.

Digital Geologic Maps: Digital geologic maps reproduce all aspects of traditional paper maps, including notes, legend, and cross sections. Bedrock, surficial, and special purpose maps such as coastal or geologic hazard maps may be used by the GRI to create digital Geographic Information Systems (GIS) data and meet park needs. These digital GIS data allow geologic information to be easily viewed and analyzed in conjunction with a wide range of other resource management information data.

For detailed information regarding GIS parameters such as data attribute field definitions, attribute field codes, value definitions, and rules that govern relationships found in the data, refer to the NPS Geology-GIS Data Model document available at: http://science.nature.nps.gov/im/inventory/geology/GeologyGISDataModel.cfm

Geologic Reports: Park-specific geologic reports identify geologic resource management issues as well as features and processes that are important to park ecosystems. In addition, these reports present a brief geologic history of the park and address specific properties of geologic units present in the park.

For a complete listing of Geologic Resource Inventory products and direct links to the download site visit the GRI publications webpage http://www.nature.nps.gov/geology/inventory/gre_publications.cfm

GRI geologic-GIS data is also available online at the NPS Data Store Search Application: http://irma.nps.gov/App/Reference/Search. To find GRI data for a specific park or parks select the appropriate park

(s), enter “GRI” as a Search Text term, and then select the Search Button.

For more information about the Geologic Resources Inventory Program visit the GRI webpage: http://www.nature.nps.gov/geology/inventory, or contact:

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The Geologic Resources Inventory (GRI) program is funded by the National Park Service (NPS) Inventory and Monitoring (I&M) Division.

GRI Digital Map and Source Map Citation

The GRI digital geologic-GIS map for the northern portion of Blue Ridge Parkway, Virginia and North Carolina (BLRI):

GRI Digital Bedrock Geologic Map of the northern portion of Blue Ridge Parkway, Virginia (*GRI MapCode BLRN*)

Produced using the following preliminary and unpublished U.S. Geological Survey digital data,

> Carter, Mark, Crider, Allen, and Southworth, Scott, 2015, Geologic Map of the Virginia portion of Blue Ridge Parkway, Virginia: U.S. Geological Survey, unpublished SIM--xxxx; scale 1:100,000 (*GRI Source Map ID 76039*).

Additional information pertaining to each source map is also presented in the Source Map Information (BLRIMAP) table included with the GRI geologic-GIS data.

Map Unit List

The bedrock geologic units present in the digital geologic-GIS data produced for the northern portion of Blue Ridge Parkway, Virginia and North Carolina (BLRI) are listed below. Units are listed with their assigned unit symbol and unit name (e.g., Jd _Diabase). Units are generally listed from youngest to oldest. Information about each geologic unit is also presented in the GRI Geologic Unit Information (BLRNUNIT) table included with the GRI geologic-GIS data. Several source unit symbols were changed in this document and in the GRI digital geologic-GIS data from their source (data) unit symbol. This was done to add a unit time designation symbol to those units not assigned on in the source digital data (e. g., unit abg is unit PZZabg with "PZZ" being added to denote the unit is Paleozic and Neoproterozoic (Z) in age).

Mesozoic Era

Jurassic Period
Jd - Diabase

Paleozoic Era

Ccq - Quartz tectonite
PZmy - Mylonite

Ordovician Period
Omb - Martinsburg Formation

Ordovician and Cambrian Periods
OCco - Conococheague Formation

Cambrian Period
Chilhowee Group
- Ce - Elbrook Formation
- Cw - Waynesboro Formation
- Cs - Shady Dolomite
- Cca - Antietam Formation
- Cce - Erwin Formation
- Cch - Hampton - Harpers formations, undivided
- Cchq - Hampton - Harpers formations, orthoquartzite
- Ccw - Weverton Formation
- CZcu - Unicoi Formation
- CZcl - Lower Chilhowee Group, undivided

Paleozoic Era and Proterozoic Eon

Paleozoic Era and Neoproterozoic Eon
Alligator Back metamorphic suite
- PZZabg - Alligator Back Formation, layered biottite-muscovite gneiss
- PZZabs - Alligator Back Formation, garnet-biotite-muscovite-quartz schist
- PZZabl - Alligator Back Formation, laminated amphibolite gneiss
- PZZabq - Alligator Back Formation, quartz and quartz-rich metasandstone
- PZZabm - Alligator Back Formation, marble

PZZum - Altered ultramafic and ultrabasic rocks

Cambrian Period and Neoproterozoic Era
Lynchburg Group
CZmg - Muscovite-biotite metagraywacke
CZms - Graphite-muscovite-quartz metasandstone
CZgs - Graphitic schist
CZamb - Lynchburg Group, biotite-bearing amphibolite
CZamc - Lynchburg Group, clinozoisite-bearing amphibolite
CZamq - Lynchburg Group, quartz-layered amphibolite

Proterozoic Eon

Neoproterzoic Era
Ashe metamorphic suite
Zacm - Ashe Formation, conglomeratic metagraywacke
Zcb - Catoctin Formation, metabasalt
Zcm - Catoctin Formation, metamudstone and phyllite
Zcs - Catoctin Formation, metasandstone
Zsr - Swift Run Formation
Zdm - Greenstone
Zgm - Metagranitoid

Mesoproterozoic Era
Yjn - Noritic jotunite and nelsonite
Yprg - Garnetiferous quartzo-feldspathic gneiss and pegmatite
Ypom - Peaks of Otter metagranitoid
Yqfm - Quartz-feldspar leucocratic metagranitoid
Yvm - Vesuvius megaporphyritic metagranitoid
Ygdm - Metagranodioritoid
Ygpm - Mesocratic porphyritic metagranitoid
Ypgm - Megacrystic metagranitoid
Ymgm - Massive metagranitoid
Yqm - Megacrystic alkali-feldspar metagranitoid
Ygg - Megacrystic granodioritic gneiss
Yllg - Leucogranitic gneiss
Ydg - Dioritic gneiss
Yplg - Pilot gneiss
Ygtg - Porphyroblastic garnet-biotite leucogranitic gneiss
Yglg - Garnetiferous leucogneiss
Yscg - Sandy Creek Gneiss
Ylgg - Lineated granitoid gneiss
Yg - Granitic gneiss
Yqg - Megacrystic alkali-feldspar gneiss
Ymg - Migmatite gneiss
Ybcm - Bottom Creek Metagranitoid
Ymlg - Biotite-muscovite leucogneiss
Ybgg - Biotite granitic augen gneiss
Ybqg - Blue-quartz gneiss
Yblg - Biotite leucogneiss

Map Unit Descriptions

Descriptions of all geologic map units, generally listed from youngest to oldest, are presented below. Unit symbols present in unit description text are as per the source map. If the GRI changed a unit symbol (see the Map Unit List section for an explanation as to why some source unit symbols were changed) then the source unit symbol along with source unit name and age are listed just before the unit's description (e.g., unit PZZabg has "abg - Alligator Back Formation, layered biottite-muscovite gneiss (Early Paleozoic and Neoproterozoic)" listed has the unit symbol was changed by the GRI).

Jd - Diabase (Early Jurassic)

Greenish-black fresh, weathers dark reddish-brown; aphanitic to fine-grained, locally medium-grained; ophitic to subophitic; major mineral constituents are plagioclase and orthopyroxene, and also typically contains abundant magnetite; occurs as dikes; commonly weathers to dense, spheroidal boulders. A diabase dike exposed along the Potomac River in Maryland yielded an amphibole 40Ar/39Ar age of 200 Ma (Kunk and others, 1992). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

PZmy - Mylonite (Paleozoic)

Lithologically and compositionally heterogeneous rocks in high-strain zones. Rocks characterized by protomylonitic to mylonitic fabric, and mostly derived from Mesoproterozoic granitoids and gneisses, but also greenstone dikes (Zdm) and metasedimentary rocks; contains some blocks of less deformed and undeformed rock. Mylonite derived from rocks of granitic composition is grayish-green fresh, weathers light olive-brown; fine- to medium-grained; lepidoblastic; strongly foliated and lineated; major mineral constituents are quartz, feldspar, white mica, chlorite, biotite, and amphibole; defines the Rockfish Valley, Peaks of Otter, Powell Gap and Fries high-strain zones. Medium- to very coarse-grained protomylonite consists of alkali-feldspar porphyroclasts up to 5.0-cm in length and distinctive dusky-blue to very dusky-purple quartz; occurs only in the Rockfish Valley high-stain zone in the vicinity of James River, MP 64. Felsic mylonite is pale-olive fresh, weathers yellowish-gray; fine- to medium-grained; major mineral constituents are quartz, feldspar, and white mica; observed in the Rockfish Valley and Peaks of Otter high-strain zones; protolith was leucogranitic gneiss (Yllg). Protomylonite derived from rocks of granodioritic composition is dusky-green fresh, weathers grayish-green; medium- to very coarse-grained; nematoblastic to lepidoblastic; major mineral constituents are chlorite, biotite, amphibole, quartz, plagioclase, and distinctive alkali-feldspar porphyroclasts, as much as 5.0-cm in length; observed only in the northern portion of the map area along Irish Creek, approximately 3 km west of MP 31; protolith was megacrystic granodioritic gneiss (Ygg). Chlorite-rich mylonite is very fine- to fine-grained; major mineral constituents are chlorite, biotite, and amphibole; derived from greenstone dikes (Zdm). Mylonite derived from metasedimentary rocks is grayish-green fresh, weathers yellowish-gray; fine- to medium-grained; rounded porphyroclasts of quartz, feldspar and composite clasts of quartz and feldspar, up to 1.0-cm in length, are entrained in a finer-grained matrix of granular quartz and feldspar, and white mica; occurs in the Rockfish Valley high-strain zone near James River (MP 64) and in the Fries high-strain zone near Roanoke River (MP 115). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Omb - Martinsburg Formation (Upper and Middle Ordovician)

Medium- to dark-gray, fine-grained calcareous mudstone, interbedded with medium-gray, fine-grained, Lingula-bearing sandstone in the upper part, and medium- to dark-gray, coarse-grained bioclastic limestone in the lower part; occurs beneath the Pulaski fault north of Roanoke River, approximately 0.85 km northwest of MP 108. Bartholomew (1981) estimates the thickness to be 305 m. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

OCco - Conococheague Formation (Lower Ordovician and Upper Cambrian)

Light- to medium-gray, fine- to medium-grained massive dolostone and well-bedded sandy dolostone, with abundant thin sandstone beds and lenses, overlain by mottled, dark-gray algal limestone, cross-laminated calcarenite, and straticulate limestone, interbedded with medium-gray, faintly laminated dolostone; light-gray, fine-grained, calcite-cemented quartzose sandstone containing minor amounts of feldspar occur both in the lower part of the unit, and with siliceous oolite at the top of the formation. Bartholomew (1981) estimates the thickness to be about 210 m. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ce - Elbrook Formation (Upper and Middle Cambrian)

Medium-gray, thinly-laminated dolostone with minor amounts of dark-gray, thick-bedded algal limestone, grading upward into cyclic sequences of algal and straticulate limestone, calcarenite, and carbonate conglomerate, interbedded with both laminated and massive dolostone; underlain by light- to medium-gray, massive to crudely-layered, unsorted carbonate breccias, consisting of angular to rounded clasts of dolostone, limestone and chert, in an unsorted matrix of finer-grained cherty carbonate, cemented by dolomite; breccia is commonly cross-hatched with abundant calcite-filled fractures. Rader and Evans (1993) give a thickness for this unit ranging from about 450 to 890 m in southeasternmost exposures, but note that estimates are lacking elsewhere due to faulting. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Cw - Waynesboro Formation (Middle and Lower Cambrian)

Mottled very dark-red and grayish-green, fine-grained mudstone, interbedded with light-gray, fine-grained sandstone and coarse-grained siltstone, with local lenses of conglomerate; numerous 3- to 15-meter-thick intervals of dark-gray, fine-grained, thinly-laminated dolostone, locally interbedded with algal limestone, are common. Spencer (1968) gives a thickness for this unit ranging from about 300 to 450 m. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Cs - Shady Dolomite (Middle and Lower Cambrian)

Medium-gray, light-gray, very light-gray and white, fine- to medium-grained, crystalline to saccharoidal, massive-bedded dolostone, with local interbeds of medium-gray to very dark-gray, fine-grained, thin-bedded limestone, dolostone and calcareous shale. Spencer (1968) gives a thickness for this unit ranging from about 300 to 450 m. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ccq - Quartz tectonite (Lower Cambrian)

Very light-gray fresh, weathers yellowish-gray; fine- to medium-grained; well-cleaved to very strongly-foliated. Occurs discontinuously along faults and likely derived from orthoquartzites of the Antietam, Erwin or Weverton formations. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Cca - Antietam Formation (Lower Cambrian)

White, bluish-white to very light-gray fresh, weathers yellowish-gray; very fine- to medium-grained; thick-bedded to massive; vitreous orthoquartzite; commonly contains abundant Skolithos linearis; typically ledge-forming; interbedded locally with brownish-black slate and yellowish-gray feldspathic metasandstone, mostly in the lower part of the formation. The name Antietam is applied to the uppermost orthoquartzite-dominated Chilhowee Group unit containing abundant Skolithos. Wilkes and others (2007) estimate the thickness of the unit to be about 150 m. (*GRI Source Map ID 76039)* (Blue

Ridge Parkway Bedrock North).

Cce - Erwin Formation (Lower Cambrian)

Very light-gray fresh, weathers yellowish-gray; fine- to medium-grained; medium- to thick-bedded; locally vitreous orthoquartzite; locally Skolithos-bearing; interbedded with brownish-gray to greenish-gray slate. The name Erwin is applied to the uppermost orthoquartzite unit in the Blue Ridge thrust sheet south of James River. Erwin contains fewer Skolithos-bearing beds, and more phyllitic interbeds, than rocks assigned to the Antietam Formation farther north in fault blocks beneath the Blue Ridge thrust. Spencer (1968) gives a thickness for this unit ranging from about 120 to 180 m. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Cch - Hampton - Harpers formations, undivided (Lower Cambrian)

Dominantly fine-grained rocks containing beds of metasandstone and Skolithos-bearing orthoquartzite. The Hampton Formation was named for exposures near the town of Hampton, Tennessee (Campbell, 1899); the Harpers Formation was defined by Keith (1894) for exposures near Harpers Ferry, West Virginia. These units occupy the same relative position within the Chilhowee Group, but correlation between the units is tenuous (Smoot, 2010; Smoot and Southworth, 2012, 2014) so they are combined into one map unit here. Unit consists of interbedded metasiltstone and metasandstone in the lower part, quartzite (Cchq) interbedded locally with phyllite and metasiltstone in the middle part, and mostly slate and phyllite interbedded locally with quartz-rich metasandstone and quartzite in the upper part. Metasiltstone is olive-gray fresh, weathers brownish-gray; fine- to medium-grained, locally coarse-grained; laminated to thin-bedded; commonly interbedded with fine- to medium-grained feldspathic metasandstone; locally bioturbated and ferruginous. Quartz-rich metasandstone is yellowish-gray to greenish-gray fresh, locally dusky-red to very dark-red, weathers moderate-brown to dark reddish-brown; fine- to coarse-grained; thin- to medium-bedded; commonly iron-stained to ferruginous and bioturbated. Slate is dark greenish-gray fresh, weathers brownish-black; very thinly-laminated to massive. Phyllite is dark greenish-gray fresh, weathers dark greenish-gray; fine-grained; thin-bedded. Quartz-rich metasandstone in the upper part of the formation is yellowish-gray fresh, brownish-gray weathered; medium- to fine-grained; medium- to thin-bedded, with thin laminations of brownish-black phyllite locally. Interbedded quartzite near the top of the formation is grayish-green fresh, light gray weathered; medium- to fine-grained; thin- to thick-bedded. In central Virginia, thickness of the unit ranges from about 250 to 360 m (Bloomer and Werner, 1955). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Cchq - Hampton - Harpers formations, orthoquartzite (Lower Cambrian)

Mostly orthoquartzite in one or more prominent beds, interbedded locally with phyllite and metasiltstone. Quartzite is white to light-gray fresh, weathers yellowish-gray; fine- to medium-grained; medium- to very thick-bedded; commonly vitreous and cross-bedded; locally Skolithos-bearing; ferruginous quartzite is dusky-red fresh, dark reddish-brown weathered; medium- to fine-grained; thick- to very thick-bedded; commonly cross-bedded; locally Skolithos-bearing. Phyllite and metasiltstone are greenish-gray fresh, weathers dusky-yellow; fine- to coarse-grained; laminated to thin-bedded. In the vicinity of James River (Blue Ridge Parkway MP 64), rocks of this unit were named the Snowden Member of the Harpers Formation (Bloomer and Werner, 1955; Brown and Spencer, 1981; Hack, 1982; Spencer and others, 1989; Spencer, 1992, 1994, 1995), with an estimated thickness ranging from 30 to 91 m (Bloomer and Werner, 1955). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ccw - Weverton Formation (Lower Cambrian)

Orthoquartzite and locally metaconglomerate. Orthoquartzite is very light-gray fresh, weathers grayish-yellow; fine- to very coarse-grained; commonly granule-conglomeratic, locally pebble-conglomeratic; medium- to thick-bedded; commonly cross-bedded; locally vitreous orthoquartzite; interbedded locally with light-gray, fine- to medium-grained, thin-bedded metasandstone, and greenish-gray, fine-grained, thin-bedded phyllite. Includes orthoquartzite assigned to the upper Unicoi Formation (e.g., Henika, 1981). Easily distinguished from Hampton-Harpers Formation orthoquartzite, in that it is typically granule-conglomeratic and does not contain Skolithos (Carter and others, 2013). A regional unconformity marks the base of the orthoquartzite above the underlying Unicoi Formation rocks (Carter and others, 2013; Smoot and Southworth, 2014). Quartz-pebble and lithic-pebble metaconglomerate of the Weverton Formation crop out on the ridge 0.95 km southeast of Round Mountain, in the vicinity of MP 24, and on the ridge 0.45 km northeast of MP 67. Quartz-pebble and lithic-pebble metaconglomerate is very light-gray fresh, weathers yellowish-gray; coarse- to very-coarse-grained; medium- to thick-bedded; contains well-rounded clasts of white quartz, very dark-red to grayish red-purple quartzite, and dark-gray to very dark-red metasiltstone, in a finer-grained matrix of mostly quartz and minor feldspar; locally reddish-purple and ferruginous. Metaconglomerate is interbedded locally with greenish-gray, fine-grained, thin-bedded phyllite and greenish-gray to very dusky red-purple, fine- to medium-grained, thin- to medium-bedded, feldspathic metasandstone. The Weverton can be mapped to the vicinity of MP 103, and ranges in thickness from 20 to 90 m. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

CZcu - Unicoi Formation (Lower Cambrian and Neoproterozoic?)

A very heterogeneous unit consisting of phyllite, metamudstone, metasiltstone, metagraywacke, metaconglomerate, and locally interlayered metabasalt; the upper part is dominated by a regional fining-upwards sequence of metagraywacke and conglomeratic metagraywacke capped by phyllite and metasiltstone; the lower, regionally discontinuous part is dominated by characteristically very dark-red, fine-grained metamudstone and slate, with metagraywacke, metaconglomerate, metavolcaniclastic phyllite and basalt locally. The unit is variably thick, ranging from less than 30 m to more than 450 m (Rader and Evans, 1993). Metamudstone and slate in the lower portion of the formation is very dark-red fresh, weathers dark reddish-brown; fine-grained; rhythmically thin-bedded to thin-laminated, locally massive; well-cleaved; contains detrital magnetite. Metagraywacke and metaconglomerate are dark greenish-gray fresh, weathers olive-gray; medium- to very coarse-grained, granule- to pebble-conglomerate; medium- to thick-bedded; locally feldspathic and lithic, with feldspar granules and dark gray, grayish-green, and very dark-red slate and metasiltstone clasts. Metavolcaniclastic phyllite is dusky-red fresh, weathers pinkish-gray; very fine- to fine- grained; thin-laminated to massive; contains lithic and volcanic fragments. Metabasalt is greenish-black fresh, weathers dark greenish-gray to moderate-brown; aphanitic to fine-grained; well-cleaved to massive; occurs mostly as ~1-m-thick layers in the lowest part, but layers as much as several 10's of meters occur north of MP 91; few display columnar joints. Henika (1981) noted scoriaceous basalt and a 5-m-thick, hematitic "meta-andesite". A block and small clasts of metabasalt occur within the upper part near MP 19; it is dusky yellowish-green fresh, weathers dusky yellowish-brown; fine- to medium-grained; nematoblastic; foliated; consists mostly of amphibole, biotite, and plagioclase; interpreted as sedimentary blocks (olistoliths). Boulder metaconglomerate occurs as isolated basal deposits above Mesoproterozoic basement rocks near MP 56, and approximately 0.7 km south of MP 96. Boulder metaconglomerate consists of pebbles, cobbles, and boulders of Mesoproterozoic metagranitoids and gneisses, in an olive-gray, fine- to coarse-grained matrix of mostly zircon, magnetite and ilmenite grains. The Unicoi Formation appears to be conformable above Neoproterozoic Catoctin Formation; basal lithologies of the unit are gradational and indistinguishable from lithologies of the Catoctin. Phyllite in the uppermost part of the formation is dark greenish-gray fresh, weathers olive-gray; very fine- to fine-grained; rhythmically thin-bedded to laminated. Phyllite is interbedded locally with metasandstone, which is greenish-gray fresh, weathers olive-gray; fine- to medium-grained, very locally granule- to pebble-conglomeratic; medium- to thick-bedded; feldspathic, with white-weathered, fine-grained feldspar grains. Metasiltstone is variegated very dark-red

to greenish-gray to dark-gray to black fresh, weathers reddish-brown; fine- to coarse-grained; typically rhythmically thin-bedded, to locally massive. Metagraywacke is dark greenish-gray to olive-gray fresh, weathers light-gray; fine- to coarse-grained, locally granule- to pebble-conglomeratic; medium- to thick-bedded; locally cross-bedded; generally quartz-rich, but locally feldspathic and lithic, with feldspar granules and dark gray, greenish-gray, and very dark-red slate, metasiltstone and metabasalt clasts; locally interbedded with medium- to thick-bedded, quartz-pebble and lithic-pebble metaconglomerate containing well-rounded clasts of white quartz, grayish-purple quartzite, and dark-gray to very dark-red metasiltstone. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

CZcl - Lower Chilhowee Group, undivided (Lower Cambrian and Neoproterozoic?)

Includes rocks assigned by previous workers to the Unicoi and/or Weverton formations, and consists of interbedded feldspathic metagraywacke, orthoquartzite, metaconglomerate, and phyllite. Feldspathic metagraywacke is dark greenish-gray fresh, weathers olive-gray to moderate-brown; coarse- to fine-grained; medium- to thick-bedded; locally dusky-red and ferruginous. Sericitic phyllite is greenish-gray fresh, weathers pale yellowish-brown; fine- to very-fine-grained, but contains coarse-grained metasandstones locally; thin laminated. Near MP 115 and southward, this unit occurs within the Fries high-strain zone, where it is highly tectonized, and consists of phyllonitic metagraywacke and sericitic phyllite. phyllonitic metagraywacke is greenish-gray fresh, weathers light olive-brown; fine- to coarse-grained; typically well-cleaved to strongly-foliated; commonly porphyroclastic and mylonitic, with feldspar and quartz granules comprising porphyroclasts in a finer-grained sericite-rich matrix; where locally undeformed, medium- to thick-bedded metagraywacke is generally quartz-rich, but locally feldspathic and lithic, with feldspar granules and dark-gray slate or metasiltstone clasts. Sericitic phyllite is light bluish-gray to greenish-gray fresh, weathers light olive-brown; very fine- to fine-grained; well-cleaved to strongly foliated; where locally undeformed, sericitic phyllite is light-gray to very dark-gray fresh, weathers light olive-gray; fine-grained; thinly-laminated to thin-bedded, and locally interbedded with gray, fine- to medium-grained, thin-bedded quartz-rich metasandstone and medium bluish-gray, fine- to medium-grained, thin- to thick-bedded lithic metasandstone. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

PZZabg - Alligator Back Formation, layered biottite-muscovite gneiss (Early Paleozoic and Neoproterozoic)

abg - Alligator Back Formation, layered biottite-muscovite gneiss (Early Paleozoic and Neoproterozoic)

Brownish-gray fresh, weathers moderate yellowish-brown; fine- to medium-grained; granoblastic to lepidoblastic; polydeformed with multiple foliations and lineations. Consists mostly of muscovite, biotite, quartz and feldspar. Characteristic, distinct thin compositional layers are defined by alternating mica- and quartz -rich domains as much as several mm-thick; likely transposed S1 foliation; deformed by several fold generations. Biotite-muscovite gneiss is interlayered locally at outcrop-scale with laminated amphibolite gneiss, as much as several m-thick, which may be transposed mafic dikes and sills. Pegmatite locally cross-cuts these rocks and may be related to the Mississippian Mount Airy Granite (Miller and others, 2006). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

PZZabs - Alligator Back Formation, garnet-biotite-muscovite-quartz schist (Early Paleozoic and Neoproterozoic)

abs - Alligator Back Formation, garnet-biotite-muscovite-quartz schist (Early Paleozoic and Neoproterozoic)

Medium-gray fresh, weathers light-gray; fine- to medium-grained; lepidoblastic to granoblastic (depending

on the amount of mica); multiple foliations, lineated and commonly crenulated; garnet porphyroblasts as much as 1-cm in diameter are common; consists mostly of garnet, muscovite, biotite, quartz and feldspar. Garnet-biotite-muscovite-quartz schist is locally interlayered with moderate-brown biotite-rich schist, pale yellowish-orange muscovite-quartz metasandstone, medium-gray biotite-muscovite gneiss, and dark greenish-gray amphibolite. These interlayers range from several centimeters- to several-meters thick, and represent transposed S1 foliation. The penetrative foliation in this unit is S2. Locally, outcrop-scale blocks of compositional-layered biotite-muscovite gneiss occur within garnet-biotite-muscovite-quartz schist; S2 foliation in schist truncates S1 compositional layering in biotite-muscovite gneiss at a high-angle. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

PZZabl - Alligator Back Formation, laminated amphibolite gneiss (Early Paleozoic and Neoproterozoic)

aml - Alligator Back Formation, laminated amphibolite gneiss (Early Paleozoic and Neoproterozoic)

Dusky-green fresh, grayish olive-green weathered; fine-grained, nematoblastic to lepidoblastic; extremely well-foliated and lineated. Distinctly thin-layered; layering consists of biotite- and hornblende-rich bands, up to several cm thick, alternating with very thin seams of quartz and some feldspar up to about a mm thick. These layers are locally folded. Garnet porphyroblasts up to several mm in diameter occur throughout this unit, which also commonly exhibits a porphyroblastic cross-amphibole texture, consisting of randomly- or weakly-aligned acicular needles of stellate and featherlike amphibole on penetrative foliation surfaces. Laminated amphibolite gneiss is interlayered regionally with, and locally interlayered within, compositionally-layered biotite-muscovite gneiss; together these rock units exhibit the “pin-striped” character of the Alligator Back Formation described by Rankin and others (1973) in northwestern North Carolina. Regionally, this unit is more biotite-rich than quartz-layered amphibolite to the northwest suggesting retrogressive metamorphism, but siliceous composition of layering is identical; laminated amphibolite gneiss may be the highly tectonized, but retrogressively metamorphosed equivalent of quartz-layered amphibolite northwest of the Rock Castle Creek fault. Very locally, altered ultramafic and ultrabasic rocks occur as minor interlayers within this unit, but these are too small to map at 1:24,000-scale. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

PZZabq - Alligator Back Formation, quartz and quartz-rich metasandstone (Early Paleozoic and Neoproterozoic)

abq - Alligator Back Formation, quartz and quartz-rich metasandstone (Early Paleozoic and Neoproterozoic)

Greenish-black fresh, dusky yellowish-green weathered; fine-grained; nematoblastic; well-foliated and lineated biotite-hornblende amphibolite, with distinctive layers, lenses, pods, stringers and boudins, up to several centimeters thick, composed of grayish-yellow to very pale-orange, fine- to medium-grained, granoblastic quartz and feldspar. These layers are deformed by several generations of folds; locally, folds are commonly ptygmatic. These siliceous layers, now clearly transposed into S1 foliation, may represent original ash deposits, or be the result of migmatization of amphibolite at higher metamorphic grade. Garnet porphyroblasts, up to several mm in diameter, occur locally throughout this unit, which also locally exhibits a porphyroblastic cross-amphibole texture, consisting of randomly- or weakly-aligned acicular needles of stellate and featherlike amphibole on penetrative foliation surfaces. Quartz-layered amphibolite is interlayered locally with graphitic schist and mica-bearing metagraywacke. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

PZZabm - Alligator Back Formation, marble (Early Paleozoic and Neoproterozoic)

abm - Alligator Back Formation, marble (Early Paleozoic and Neoproterozoic)
Grayish orange-pink fresh, weathers very pale-orange; medium-grained; granoblastic, crystalline; weakly foliated; consists mostly of calcite with interstitial acicular nematoblasts of amphibole locally. Locally thin-layers, as much as several cm-thick, comprised of alternating layers of lighter- and darker-pink- and orange-hued crystalline calcite. Acicular needles of amphibole occur at the contacts. Marble occurs as several small lenses within garnet-biotite-muscovite-quartz schist 1.6 km east of MP 173. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

PZZum - Altered ultramafic and ultrabasic rocks (Early Paleozoic and Neoproterozoic)

um - Altered ultramafic and ultrabasic rocks (Early Paleozoic and Neoproterozoic)
A mineralogically and texturally heterogeneous suite of lithologies; serpentine-talc schists and talc-amphibole schists are most common. These rocks are dusky-green to dusky blue-green fresh, weathering light greenish-gray; generally fine- to medium-grained; lepidoblastic to granoblastic; well-foliated, typically lineated, and locally crenulated. Serpentine-talc schists consist primarily of serpentine, talc, epidote, and chlorite; relict olivine grains occur locally; rarely, schist contains large clinopyroxene porphyroblasts or poikiloblasts, up to several cm in diameter, which gives the weathered rock a leopard-skin or spotted appearance. Talc-amphibole schists consist primarily of talc, tremolite, actinolite, anthophyllite, chlorite, biotite, and epidote. Very locally, tremolite and actinolite comprise nearly 90% of the rock, producing a grayish-green, medium-grained nematoblastic schist consisting of aligned amphibole needles. Talc-amphibole schists are interpreted to be retrogressively altered ultramafic rocks, whereas serpentine-talc schists are interpreted to be retrogressively altered ultrabasic rocks. All of these altered ultramafic and ultrabasic lithologies are locally interlayered with dusky yellowish-green, fine- to medium-grained, nematoblastic hornblende-feldspar amphibolite, and very locally with grayish olive-green, medium- to coarse-grained, granoblastic hornblende-pyroxene-quartz-feldspar metagabbro. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

CZmg - Muscovite-biotite metagraywacke (Cambrian and Neoproterozoic)

lmg - Muscovite-biotite metagraywacke (Cambrian and Neoproterozoic)
Medium- to dark-gray fresh, weathers light-gray; fine- to coarse-grained; granoblastic to lepidoblastic; polydeformed, well-foliated, lineated and locally crenulated; locally exhibits a porphyroblastic cross-biotite texture; garnet porphyroblasts ranging from 0.5- to several mm in diameter are common; consists mostly of garnet, muscovite, biotite, quartz and feldspar. Hornblende typically occurs near contacts with amphibolite interlayers. Metagraywacke is locally interlayered with mica-rich schist, quartz- and feldspar-rich metasandstone, and amphibolite. These interlayers range from several cm- to m-thick, and may be compositional beds or igneous contacts transposed by S1 foliation. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

CZms - Graphite-muscovite-quartz metasandstone (Cambrian and Neoproterozoic)

lms - Graphite-muscovite-quartz metasandstone (Cambrian and Neoproterozoic)
Light-gray to yellowish-gray fresh, weathers grayish-orange; medium- to coarse-grained; granoblastic to lepidoblastic; polydeformed, well-foliated, lineated and locally crenulated; very locally exhibits a porphyroblastic cross-biotite texture; consists mostly of graphite, muscovite, biotite, quartz and feldspar. Metasandstone is locally interlayered with graphitic schist, muscovite schist, and amphibolite. These

interlayers range from several cm-to m-thick, and may be compositional beds or igneous contacts transposed by S1 foliation. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

CZgs - Graphitic schist (Cambrian and Neoproterozoic)

lgs - Graphitic schist (Cambrian and Neoproterozoic)
Graphitic schist and graphitic metagraywacke. Graphitic schist is grayish-black fresh, weathers dusky yellowish-brown; very fine- to fine-grained; lepidoblastic; polydeformed, well-foliated, lineated and locally crenulated; commonly exhibits a porphyroblastic cross-biotite texture; garnet porphyroblasts are also common; consists mostly of graphite, biotite, muscovite, quartz and feldspar. Locally, rhythmically thin-layers consisting of graphite- and mica-rich layers alternating with quartz-rich layers as much as several mm-thick; layers may be compositional beds transposed by S1 foliation. Graphite-bearing metagraywacke is dark-gray fresh, weathers brownish-gray; fine- to coarse-grained; granoblastic to lepidoblastic; polydeformed, well-foliated, lineated and locally crenulated; commonly exhibits a porphyroblastic cross-biotite texture; garnets porphyroblasts are common; consists mostly of graphite, biotite, muscovite, quartz and feldspar. Graphitic schist and metagraywacke are locally interlayered with mica-rich schist, mica-quartz metasandstone, and amphibolite. Interlayers range from several cm- to several m-thick, and may be compositional beds or igneous contacts, transposed into S1 foliation. Very locally, pods and lenses of altered ultramafic rock occur within graphitic schist. These are blocks of igneous/volcanic rocks deposited in pelitic rocks in a marine depositional sedimentary or tectonic environment. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

CZamb - Lynchburg Group, biotite-bearing amphibolite (Cambrian and Neoproterozoic)

amb - Lynchburg Group, biotite-bearing amphibolite (Cambrian and Neoproterozoic)
Dark greenish-gray to greenish-black fresh, weathers dark reddish-brown; typically fine- to medium-grained; nematoblastic; well-foliated, typically lineated, and locally crenulated. Locally, massive varieties are fine- to medium-grained, granoblastic, and weakly- to nonfoliated. Amphibolite of this unit consists mostly of hornblende, feldspar, and varying amounts of biotite, likely as a retrogressive metamorphic product; additional minerals include clinozoisite and quartz. Locally, nematoblasts of stellate and featherlike amphibole occur randomly or weakly-aligned on penetrative foliation surfaces. These needles overprint earlier lineations defined by mineral aggregates of biotite or hornblende. Another common lithology in this unit is graphite-bearing amphibolite: greenish-black to brownish-black fresh, weathers olive-black; typically fine-grained; lepidoblastic due to abundant graphite and biotite, well-foliated, typically lineated, commonly crenulated. This amphibolite locally exhibits a porphyroblastic cross-amphibole texture, consisting of randomly- or weakly-aligned acicular needles of stellate and featherlike amphibole on penetrative foliation surfaces that overprint earlier-formed lineations defined by biotite and graphite. Amphibolite is interlayered locally with graphitic schist, mica schist, mica-bearing metagraywacke, and quartz-rich metasandstone. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

CZamc - Lynchburg Group, clinozoisite-bearing amphibolite (Cambrian and Neoproterozoic)

amc - Lynchburg Group, clinozoisite-bearing amphibolite (Cambrian and Neoproterozoic)
This unit includes several textural and mineralogical varieties of amphibolite, but porphyroblastic clinozoisite-bearing amphibolite is the most distinctive. Clinozoisite-bearing amphibolite is dusky-green to dusky yellowish-green fresh, weathers grayish green, medium- to coarse-grained, nematoblastic, granoblastic, porphyroblastic to poikiloblastic depending on the ratio of amphibole to clinozoisite in the rock; generally foliated, locally lineated, and rarely crenulated; consists mostly of hornblende, feldspar,

and varying amounts of biotite and quartz. Very pale-orange to pale greenish-yellow porphyroblasts of clinozoisite, up to 1.0-cm in diameter, are characteristic and distinctive. Weathered outcrops and hand-specimens exhibit characteristic pitted, or honey-combed texture where clinozoisite nodules have preferentially eroded away. Graphite-bearing amphibolite, described above, also occurs in this unit, as does a coarse- to very-coarse-grained variety of amphibolite comprised of large nematoblasts of hornblende, up to 3.0-cm in length, within a finer-grained matrix of biotite-hornblende and feldspar. Garnet porphyroblasts, ranging from less than a millimeter to several millimeters in diameter, commonly occur in all amphibolitic lithologies. Amphibolite is interlayered locally with graphitic schist, mica schist, mica-bearing metagraywacke, and quartz-rich metasandstone. Modified from Dietrich (1959). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

CZamq - Lynchburg Group, quartz-layered amphibolite (Cambrian and Neoproterozoic)

amq - Lynchburg Group, quartz-layered amphibolite (Cambrian and Neoproterozoic)
Greenish-black fresh, dusky yellowish-green weathered; fine-grained; nematoblastic; well-foliated and lineated biotite-hornblende amphibolite, with distinctive layers, lenses, pods, stringers and boudins, up to several centimeters thick, composed of grayish-yellow to very pale-orange, fine- to medium-grained, granoblastic quartz and feldspar. These layers are deformed by several generations of folds; locally, folds are commonly ptygmatic. These siliceous layers, now clearly transposed into S1 foliation, may represent original ash deposits, or be the result of migmatization of amphibolite at higher metamorphic grade. Garnet porphyroblasts, up to several mm in diameter, occur locally throughout this unit, which also locally exhibits a porphyroblastic cross-amphibole texture, consisting of randomly- or weakly-aligned acicular needles of stellate and featherlike amphibole on penetrative foliation surfaces. Quartz-layered amphibolite is interlayered locally with graphitic schist and mica-bearing metagraywacke. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Zacm - Ashe Formation, conglomeratic metagraywacke (Neoproterozoic)

Light brownish-gray to yellowish-gray fresh, weathers grayish-orange-pink; medium- to very coarse-grained; granoblastic to lepidoblastic; well-foliated and lineated; consists mostly of muscovite, biotite, quartz and feldspar. Pebbles of quartz and feldspar are common throughout the unit; pebbles and cobbles of metagranitoid and rare amphibolite occur locally. Pebbles are elongated in the foliation; very rarely, pebbles show crude grading. Conglomeratic metagraywacke is interlayered regionally and at outcrop-scale with finer-grained metagraywacke, mica-rich schist, and quartz- and feldspar-rich metasandstone. These interlayers range from several cm- to m-thick, and may have been beds. Interlayered metagraywacke has thin layers comprised of alternating mica- and quartz-rich layers several mm-thick. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Zcb - Catoctin Formation, metabasalt (Neoproterozoic)

Dark greenish-gray to greenish-black fresh, weathers olive-gray; fine-grained; typically schistose; massive, but locally thin- to thick-layered; major mineral constituents are chlorite, epidote, actinolite, albite, and quartz; locally highly magnetic. Vesicules, breccias, columnar joints, and pillow structures are common locally. Amygdaloidal metabasalt, massive epidosite, and epidote-quartz breccia occur locally; Bartholomew (1977) also reports metatuff. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Zcm - Catoctin Formation, metamudstone and phyllite (Neoproterozoic)

Metamudstone is very dark-red fresh, weathers grayish-red; fine-grained; thin-laminated to massive; locally highly magnetic; interbedded locally with dark greenish-gray, medium- to coarse-grained, thin- to medium-bedded metagraywacke. Phyllite is dusky-red fresh, weathers grayish-red; very fine- to fine-grained; thin-laminated to massive; contains light bluish-gray, sericite-rich clasts several cm in length. These rocks occur in discontinuous beds less than 15-m-thick within but near the top of the formation. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Zcs - Catoctin Formation, metasandstone (Neoproterozoic)

Grayish yellow-green fresh, weathers dusky-yellow; medium- to coarse-grained; thin- to thick-bedded; locally quartz-rich and vitreous, or sericitic and phyllitic; occurs within metabasalt as discontinuous lenses less than 30-m-thick; interpreted as fluvial channel-fill deposits. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Zsr - Swift Run Formation (Neoproterozoic)

Swift Run Formation (Jonas and Stose, 1939; Stose and Stose, 1946; King, 1950) consists of a thin and discontinuous sequence of arkosic quartzite, conglomerate, laminated slate, and pebbly pyroclastic slate unconformable above Mesoproterozoic basement rocks (Southworth and others, 2009). Unit consists of several lithologies: phyllite, metasiltstone and metasandstone occur northeast of MP 14 (Bartholomew, 1977); southwest of MP 14 lithic-pebble and boulder conglomerate, metagraywacke, metamudstone, and phyllite dominate. Phyllite is greenish-gray to light bluish-gray fresh, weathers light-gray to yellowish-gray; fine- to medium-grained; well-foliated. Metasiltstone is locally thin-bedded to laminated; major mineral constituents in both rock types are chlorite, sericite and quartz; interbedded with metasandstone, which is greenish-gray to pinkish-gray fresh, weathers light-gray; medium- to coarse-grained; locally cross-bedded; schistose; quartz-rich, locally feldspathic. Lithic-pebble conglomerate is greenish-gray fresh, weathers light-gray; coarse- to very coarse-grained; thin- to medium-bedded, but bedding is typically disrupted by penetrative cleavage and mylonitic foliation; contains feldspar granules and well-rounded clasts of white vein quartz, granitoid, dark-gray to very dark-red metamudstone, and rare dark greenish-gray metabasalt, in a finer-grained matrix of sericite, quartz and feldspar. Metagraywacke is dark greenish-gray to olive-gray fresh, weathers light-gray; fine- to coarse-grained, locally granule-conglomeratic; medium- to thick-bedded; feldspathic and lithic with feldspar granules and dark-gray, greenish-gray, and very dark-red slate clasts. Metamudstone, slate and phyllite are dusky-red to very dark-red fresh, weathers grayish-pink to pale-red; fine-grained; typically thin-laminated; locally interbedded with metagraywacke. Boulder metaconglomerate near MP 28 consists of pebbles, cobbles, and boulders in a light-gray, fine- to coarse-grained, meta-arkosic matrix. Clasts consist mostly of white quartz, very pale-orange quartzite and metasandstone, and dark greenish-gray metabasalt. Metaconglomerate is medium- to thick-bedded, and interbedded locally with light olive-gray medium- to coarse-grained, locally granule conglomeratic; thin- to medium-bedded; feldspathic metagraywacke. Bartholomew (1977) reports a thickness for this unit ranging from 0 to 305 m. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Zdm - Greenstone (Neoproterozoic)

Dark greenish-gray fresh, weathers grayish-red, fine- to medium-grained, nematoblastic to lepidoblastic, well-foliated, but locally massive; locally mylonitic; consists mostly of chlorite, with amphibole, biotite, and plagioclase, and minor amounts of quartz and alkali-feldspar; near Wimmers Spur at Blue Ridge Parkway MP 141, rocks of this unit are medium-grained, nematoblastic to granoblastic, and consist of mostly actinolite and tremolite, with some talc, hornblende, biotite, and chlorite. Rocks of this unit occur locally as narrow dikes and sills that intrude older Mesoproterozoic rocks throughout the Parkway

corridor; alteration of dike and adjacent Mesoproterozoic rock to coarse-grained unakite is common. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Zgm - Metagranitoid (Neoproterozoic)

Light bluish-gray fresh, weathers yellowish-gray; fine- to medium-grained; porphyritic, porphyroclastic, granoblastic; typically foliated, but massive locally; locally protomylonitic to mylonitic metagranitoid. Rocks of this unit range from biotite granite to biotite-hornblende granodiorite in composition; major mineral constituents are quartz, alkali-feldspar, plagioclase, biotite, muscovite, hornblende, and trace fluorite. Protomylonitic to mylonitic foliation is characterized by saussuritized feldspar, sericite, and chlorite; granodioritic rocks of this unit locally exhibit a coarse-grained, cross-biotite texture. Rocks of this unit occur as small plutons, stocks, and few dikes, most too small to accurately separate and map at 1:24,000-scale, intrusive into older Mesoproterozoic rocks throughout the Parkway corridor. These rocks are correlative with Neoproterozoic Crossnore (Rankin and others, 1983) and Robertson River igneous suites (Tollo and others, 1991). North of MP 64, these rocks are associated with the Irish Creek pluton (Hudson and Dallmeyer, 1982; Good, 1991). Rock of the Suck Mountain pluton crop out along Hunting Creek, approximately 0.85 km south of MP 65, within the Rockfish Valley high-strain zone. These rocks are light- to medium-gray; medium- to coarse-grained; with mylonitic foliation defined by laminar bands of fine-grained quartz, biotite, stilpnomelane and muscovite that anastomose around fractured alkali feldspar porphyroclasts. South of MP 115, equivalent rocks intrude Mesoproterozoic biotite augen gneiss (Ybgg), and are likely associated with a dike swarm from the Dillions Mill Granite (Bartholomew and others, 1994; Tollo and others, 1994). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Yjn - Noritic jotunite and nelsonite (Mesoproterozoic)

Noritic jotunite is dark greenish-gray to black fresh, weathers grayish-red, fine- to medium-grained, nematoblastic to granoblastic; weakly foliated to massive; Major mineral constituents are orthopyroxene, clinopyroxene, plagioclase, and some hornblende; occurs as small dikes northwest of MP 78, and near MP 137.5. Nelsonite is very dark-gray to black weathered; medium- to coarse-grained; generally equigranular; granoblastic; massive to weakly foliated; major mineral constituents are ilmenite, apatite, rutile and zircon, with magnetite, pyroxene and amphibole locally; occurs as dikes, sills and small laccoliths north of Roanoke River (MP 115). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Yprg - Garnetiferous quartzo-feldspathic gneiss and pegmatite (Mesoproterozoic)

Dark greenish-gray fresh, weathers yellowish-gray; fine- to medium-grained; granoblastic, nematoblastic and porphyroblastic; major mineral constituents are quartz, plagioclase, biotite, magnetite and abundant pale red-purple garnet; strongly foliated with distinct 0.2 to 0.4 cm-thick segregation layers. Layers are alternating bands with abundant, purplish-pink garnet porphyroblasts up to 0.4-cm in diameter and bands consisting of pin-head garnets up to 1-mm in diameter; layers are typically accentuated by weathering, and intruded at high angle by undeformed pegmatite dikes. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ypom - Peaks of Otter metagranitoid (Mesoproterozoic)

Grayish-green fresh, weathers greenish-gray; fine- to medium-grained; hypidiomorphic-granular, granoblastic to nematoblastic; massive to foliated; protomylonitic to mylonitic locally; major mineral constituents are quartz, plagioclase, alkali-feldspar, biotite, hornblende and hypersthene. Discontinuous

anastomosing bands, 0.2 to 0.5-cm-thick, of uralitized pyroxene, hornblende, and biotite, may represent primary flow banding. Paleozoic penetrative protomylonitic to mylonitic foliation is characterized by saussuritized feldspar, sericite, and chlorite. Forms a large pluton from MP 78 to 86. Contains xenoliths of megacrystic metagranitoid (Ypgm) and quartz-feldspar leucocratic metagranitoid (Yqfm). Occurs as small dikes and sills in megacrystic metagranitoid (Ypgm). Carter and others (2012, 2013) report a preliminary SHRIMP U-Pb zircon age-date of ~1.0 Ga. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Yqfm - Quartz-feldspar leucocratic metagranitoid (Mesoproterozoic)

Light bluish-gray fresh, weathers very pale-orange to yellowish-gray; medium- to very coarse-grained; hypidiomorphic-granular, granoblastic; massive to foliated; locally protomylonitic to mylonitic; composed mostly of grayish-blue quartz and feldspar; other mineral constituents are biotite, hornblende, and hypersthene; occurs as numerous dikes and sills that cut older rocks as well as two map-scale xenoliths within Peaks of Otter metagranite (Ypom) near MP 86; Carter and others (2012, 2013) report a preliminary SHRIMP U-Pb zircon age-date of ~1.02 Ga. Another regional suite of coarse-grained to pegmatitic, locally tourmaline-bearing quartz-feldspar leucogranitoid dikes and sills intrude rocks as young as ~1.0 Ga near MP 84. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Yvm - Vesuvius megaporphyritic metagranitoid (Mesoproterozoic)

Dusky blue-green fresh, weathers pale reddish-brown; very coarse-grained; porphyritic; porphyroclastic to protomylonitic; major mineral constituents are quartz, plagioclase, biotite, hornblende and hypersthene, with alkali-feldspar phenocrysts, porphyroblasts, and porphyroclasts, commonly as much as 10 cm long; massive to foliated; Paleozoic protomylonitic foliation is penetrative locally, and characterized by saussuritized feldspar, sericite, and chlorite; intrudes alkali-feldspar megacrystic metagranitoid (Yqm) near MP 27. A preliminary SHRIMP U-Pb zircon age-date for this rock unit is ~1.02 Ga (J. Aleinikoff, USGS, written comm., 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ygdm - Metagranodioritoid (Mesoproterozoic)

Dark greenish-gray fresh, weathers greenish gray; fine- to coarse-grained; hypidiomorphic-granular, porphyritic to porphyroclastic; larger bodies (stocks and plutons) are coarse-grained and hypidiomorphic-granular; plugs, dikes, and sills are fine- to medium-grained and porphyritic to porphyroclastic; major mineral constituents are quartz, plagioclase, alkali-feldspar, biotite, hornblende and orthopyroxene; massive to foliated. Paleozoic protomylonitic to mylonitic foliation is penetrative, and characterized by saussuritized feldspar, sericite, and chlorite. A small pluton near MP 34 contains xenoliths of felsic and mafic meta-igneous rocks. Preliminary SHRIMP U-Pb zircon ages are ~1.03 to ~1.04 Ga, with ~1.05 Ga xenoliths (J. Aleinikoff, USGS, written comm., 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ygpm - Mesocratic porphyritic metagranitoid (Mesoproterozoic)

Pale-olive to grayish-green to dusky yellowish-green fresh, weathers grayish-green to yellowish-gray; coarse- to very coarse-grained; commonly porphyritic to porphyroclastic, but locally hypidiomorphic-granular; strongly foliated, but locally massive; major mineral constituents are pale-blue quartz, plagioclase, alkali-feldspar, biotite, hornblende and orthopyroxene; alkali-feldspar phenocrysts and porphyroclasts are commonly 2.0 to 5.0 cm long; an early ductile amphibolite-facies foliation consists of discontinuous anastomosing, lepidoblastic to nematoblastic bands, 0.2 to 1.0 cm thick, of fine- to medium-grained, uralitized pyroxene, hornblende, and biotite; penetrative greenschist-facies Paleozoic

foliation is characterized by saussuritized feldspar, sericite, and chlorite. Contains xenoliths of older gneiss, and occurs as small xenoliths within Peaks of Otter metagranitoid (Ypom) near MP 86. Preliminary SHRIMP U-Pb zircon ages range from ~1.07 to ~1.05 Ga (Carter and others, 2012, 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ypgm - Megacrystic metagranitoid (Mesoproterozoic)

Dark greenish-gray fresh, weathers greenish-gray; hypidiomorphic-granular to porphyritic; characterized by very light-gray to grayish-pink, alkali-feldspar phenocrysts as much as 1 cm long in a fine- to medium-grained, hypidiomorphic-granular, granoblastic to nematoblastic matrix of quartz, plagioclase, hornblende and hypersthene; massive to foliated; protomylonitic to mylonitic locally, which is Paleozoic in age and characterized by saussuritized feldspar, sericite, and chlorite. Occurs as plutons, laccoliths, plugs, dikes, and sills that cross-cut older rocks from MP 66.5 to 78; considered to be a finer-grained, porphyritic phase of megacrystic metagranitoid (Ypgm). Carter and others (2012, 2013) report a preliminary SHRIMP U-Pb zircon age-date of ~1.05 Ga. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ymgm - Massive metagranitoid (Mesoproterozoic)

Dark greenish-gray fresh, weathers greenish-gray; fine- to medium-grained; hypidiomorphic-granular, granoblastic to nematoblastic; massive to foliated; major mineral constituents are quartz, plagioclase, hornblende and hypersthene; an early ductile amphibolite-facies foliation consists of discontinuous anastomosing bands, 0.2 to 0.5 cm thick, of uralitized pyroxene, hornblende, and biotite; locally penetrative greenschist-facies Paleozoic foliation is characterized by saussuritized feldspar, sericite, and chlorite; occurs from MP 112-115. A preliminary SHRIMP U-Pb zircon age-date for this rock unit is ~1.08 Ga (J. Aleinikoff, USGS, written comm., 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Yqm - Megacrystic alkali-feldspar metagranitoid (Mesoproterozoic)

Grayish-green fresh, weathers yellowish-gray; coarse- to very coarse-grained; porphyritic to coarsely porphyroclastic; characterized by large alkali-feldspar phenocrysts and porphyroclasts, commonly 2.0 to 5.0 cm long, and grayish-blue quartz; other mineral constituents are biotite, hornblende and orthopyroxene. Alternating bands of mafic (uralitized pyroxene, hornblende, and biotite) and felsic (quartz and feldspar) minerals characterize a weak and discontinuous compositional layering, which may be flow foliation; mafic bands are 0.3 to 0.6 cm thick and felsic bands are 0.8 to 2.0 cm thick. Paleozoic protomylonitic to mylonitic foliation is penetrative, and overprints the early foliation. Paleozoic mylonitic foliation is characterized by saussuritized feldspar, sericite, and chlorite. Gradational with coarse-grained metagranitoid, which is pale-olive to grayish-green fresh, weathers grayish-green; coarse- to very coarse-grained; generally hypidiomorphic-granular, but commonly porphyritic to coarsely porphyroclastic; major mineral constituents are grayish-blue quartz, plagioclase, alkali-feldspar, biotite, hornblende and orthopyroxene; alkali-feldspar phenocrysts and porphyroclasts are commonly 1.0 to 3.0 cm long; foliated. Intruded by metagranitoid (Ygdm) and occurs as xenoliths within it. A preliminary SHRIMP U-Pb zircon age-date for this rock unit is ~1.08 Ga (J. Aleinikoff, USGS, written comm, 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ygg - Megacrystic granodioritic gneiss (Mesoproterozoic)

Grayish-green fresh, weathers yellowish-gray; porphyroclastic; strongly foliated; lepidoblastic to nematoblastic; mafic layers, 0.5 to 1.0 cm thick, consists of fine- to medium-grained, chlorite, biotite, hornblende, and hypersthene anastomosing around coarse- to very coarse-grained porphyroclasts of

potassium feldspar, 1.5 to 3.5 cm in length, or composite clasts of quartz and feldspar. Commonly concordantly interlayered with granitic gneiss (Yg), suggesting intrusion before high-grade metamorphism and deformation; unit has small xenoliths of megacrystic alkali-feldspar gneiss (Yqg). Higher mafic mineral content, and composite porphyroclasts of quartz and feldspar, distinguish these rocks from megacrystic alkali-feldspar gneiss (Yqg). Cross-cutting relationships are confirmed by a preliminary SHRIMP U-Pb zircon age-date of ~1.14 Ga (J. Aleinikoff, USGS, written comm., 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Yllg - Leucogranitic gneiss (Mesoproterozoic)

Grayish yellow-green fresh, weathers yellowish-gray; consists mostly of quartz, plagioclase, potassium feldspar, biotite, hornblende, garnet, and locally hypersthene; well-foliated, with 0.5 to 1.0 cm thick, medium-grained, granoblastic layers of quartz and feldspar separated by nearly continuous 0.1 to 0.2 cm thick, fine- to medium-grained, lepidoblastic to nematoblastic mafic layers with garnet. The most areally extensive Mesoproterozoic unit in the Blue Ridge Parkway corridor. Cross-cutting relationships show that that it is intruded by, and occurs as xenoliths within all other Mesoproterozoic rock units, as supported by a preliminary SHRIMP U-Pb zircon age of ~1.2 Ga (Carter and others, 2012, 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ydg - Dioritic gneiss (Mesoproterozoic)

Greenish-black fresh, weathers olive-gray; fine- to medium-grained; granoblastic to nematoblastic; strongly foliated, with distinct 0.2 to 0.4 cm thick segregation layers, which are typically accentuated by weathering; major mineral constituents are hypersthene, clinopyroxene, hornblende, plagioclase, quartz, and garnet; south of Roanoke River, retrogressive alteration to amphibolite is common, with hornblende, actinolite and epidote as major mineral constituents. Rocks are correlative to Nellysford Gneiss of Bartholomew and Lewis (1984) and possibly the Pilot Gneiss of Bartholomew and others (1994). Thin compositional layering suggests a mafic volcanic protolith; sharp and locally discordant contacts with other Mesoproterozoic gneiss units and regional map-patterns suggest these rocks may have originated as intrusive dikes and sills, and thick, extrusive basalt-like flows, now boudinaged and distended by multiple Mesoproterozoic and Paleozoic orogenic cycles). Carter and others (2012) report a preliminary SHRIMP U-Pb zircon age-date of ~1.14 Ga. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Yplg - Pilot gneiss (Mesoproterozoic)

Grayish-pink to grayish orange-pink to grayish-green, massive to layered granulite gneiss, intruded by dikes and sills of greenish-gray, fine-grained amphibolite, and moderate-pink granitoid; epidosite-unakite alteration zones are common. Fine-grained amphibolite is lithologically similar to dioritic gneiss (Ydg), and thus may be correlative. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ygtg - Porphyroblastic garnet-biotite leucogranitic gneiss (Mesoproterozoic)

Yellowish-gray fresh, weathers very pale-orange; granoblastic; consists mostly of fine- to medium-grained, quartz and feldspar, with garnet porphyroblasts 0.1 to 0.3 mm in diameter; fine-grained biotite, hornblende and hypersthene occur locally; strong foliation marked by discontinuous bands of garnet, biotite, hornblende and hypersthene separating 0.5 to 2.0 cm thick layers of quartz and feldspar, making a “spotty” texture; interlayered locally with leucogranitic gneiss (Yllg) and layered granitic gneiss (Yg). Preliminary SHRIMP U-Pb zircon ages range from ~1.15 to ~1.14 Ga (J. Aleinikoff, USGS, written comm., 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Yglg - Garnetiferous leucogneiss (Mesoproterozoic)

Yellowish-gray fresh, weathers grayish-yellow; consists of medium- to coarse-grained, granoblastic to porpyroclastic gneiss, with garnet porphyroblasts and poikiloblasts up to 1.0 cm in diameter. Other minerals include quartz and feldspar porphyroclasts, medium-grained pyroxene and hornblende, fine-grained biotite and pin-head garnets up to 1.0 mm in diameter, cubic magnetite and ilmenite, 0.2 cm long; strong foliation defined by nearly continuous segregated layers, 0.5 to 1.0 cm thick, of hornblende, pyroxene, and garnet separating 0.5 to 1.5 cm thick layers of quartz and feldspar, and small crystals of garnets, biotite, and magnetite/ilmenite; locally concordantly interlayered with leucogranitic gneiss (Yllg); composition and regional relationships suggest a felsic volcanic protolith for this unit. Preliminary SHRIMP U-Pb zircon ages range from ~1.16 to ~1.15 Ga (J. Aleinikoff, USGS, written comm., 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Yscg - Sandy Creek Gneiss (Mesoproterozoic)

Light-gray to greenish-gray; medium- to coarse-grained; segregation-banded to massive; major mineral constituents are quartz, feldspar, and pyroxene, and garnet, hornblende and biotite. Similar lithologically to garnetiferous leucogneiss (Yglg), but may include interlayers of paragneiss (S. Southworth, USGS, oral comm., 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ylgg - Lineated granitoid gneiss (Mesoproterozoic)

Yellowish-gray fresh, weathers yellowish-gray; granoblastic to nematoblastic; consists of fine- to medium-grained, quartz and feldspar, medium- to coarse-grained pyroxene and hornblende, garnet porphyroblasts about 0.1 cm in diameter, and red biotite about 0.2 cm long; layers of pyroxene crystals, separated by 0.5 to 1.0 cm thick layers of quartz, feldspar, garnet, and biotite, defines a foliation that gives the rock a rodded, spotted or nearly continuous planar layering on foliation surfaces. Concordantly interlayered at m-scale locally with layered leucogranitic gneiss (Yllg); Carter and others (2012, 2013) report a preliminary SHRIMP U-Pb zircon age of ~1.16 Ga. (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Yg - Granitic gneiss (Mesoproterozoic)

Grayish-green fresh, weathers yellowish-gray; consists of quartz, feldspar, biotite, hornblende, and hypersthene; strongly foliated, with medium-grained, granoblastic, quartz and feldspar layers, 0.8 to 1.2 cm thick, separated by nearly continuous, 0.2 to 0.4 cm thick, fine- to medium-grained, lepidoblastic to nematoblastic mafic layers; interlayered most commonly with megacrystic granodioritic gneiss (Ygg). A preliminary SHRIMP U-Pb zircon age for this unit is ~1.17 Ga (J. Aleinikoff, USGS, written comm., 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Yqg - Megacrystic alkali-feldspar gneiss (Mesoproterozoic)

Yellowish-gray to grayish-green fresh, weathers yellowish-gray to very pale-orange to light bluish-gray; composed mostly of coarse-grained, granoblastic, grayish-blue quartz and coarse- to very coarse-grained feldspar porphyroclasts, with minor biotite, hornblende, and rare hypersthene. Strong foliation defined by aligned quartz and feldspar in layers 0.8 to 1.3 cm thick, and where present, fine- to medium-grained, lepidoblastic to nematoblastic mafic layers 0.2 to 0.8 cm thick; locally mylonitic; Megacrystic alkali-feldpsar gneiss is intruded by small plugs, dikes, and sills of megacrystic granodioritic gneiss (Ygg) and granitoid gneiss (Yg), most of which are too small to portray on the map. Higher quartzo-feldspathic mineral content distinguishes this unit from megacrystic granodioritic gneiss. These rocks occur as xenoliths within some younger units. A Preliminary SHRIMP U-Pb zircon age for this unit is

~1.19 Ga (J. Aleinikoff, USGS, written comm., 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ymg - Migmatite gneiss (Mesoproterozoic)

Consists of alternating melanosomes and leucosomes, 1.0 cm to 0.3 m thick. Melanosomes are greenish-black fresh, grayish-green weathered, nematoblastic to lepidoblastic and consist mostly of fine- to medium-grained, chlorite, biotite, hornblende, hypersthene, and clinopyroxene. Leucosomes are medium bluish-gray fresh, yellowish-gray weathered, granoblastic and consist mostly of medium- to coarse-grained quartz and feldspar. Garnet porphyroblasts are locally common. Isoclinal and ptygmatic folds parallel foliation, which is cross-cut locally by coarse- to very coarse-grained quartz-feldspar pegmatite and medium- to coarse-grained, hypidiomorphic-granular, hypersthene-bearing metagranitoid. The protolith could be stratified volcanic rocks, but anatexic character and intense deformation support a syntectonic origin associated with emplacement of GROUP II metagranitoids. A preliminary SHRIMP U-Pb zircon age is ~1.05 Ga (J. Aleinikoff, USGS, written comm., 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ybcm - Bottom Creek Metagranitoid (Mesoproterozoic)

Includes megacrystic metagranitoid and finer-grained metagranitoid. Megacrystic metagranitoid is dusky-green fresh, weathers greenish-gray; coarse- to very coarse-grained; porphyritic, porphyroclastic; massive to foliated, protomylontic locally; consists of a matrix of quartz, plagioclase, biotite, hornblende, hypersthene, and clinopyroxene, with megacrysts of perthite commonly as much as 10 cm long; protomylonitic foliation is penetrative locally, and characterized by saussuritized feldspar, sericite, and chlorite. A preliminary SHRIMP U-Pb zircon age-date for this lithology is ~1.12 Ga (J. Aleinikoff, USGS, written comm., 2013). Finer-grained metagranitoid of this unit is greenish-gray to grayish-green fresh, weathers grayish-green; medium- to coarse-grained; generally hypidiomorphic-granular, but commonly porphyritic, porphyroblastic, or locally porphyroclastic; massive to foliated; pervasively protomylontic locally; consists of perthitic feldspar phenocrysts and porphyroblasts, commonly 1.0 to 3.0 cm in length, in a finer-grained matrix of quartz, plagioclase, biotite, orthopyroxene and hornblende; protomylonitic foliation is penetrative locally, and characterized by saussuritized feldspar porphyroclasts about 1.0 cm long, in a finer-grained matrix of quartz, plagioclase, biotite, sericite and chlorite. Finer-grained metagranitoid intrudes megacrystic metagranitoid (Bartholomew, 1981; Bartholomew and Lewis, 1984; Bartholomew and others, 2000). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ymlg - Biotite-muscovite leucogneiss (Mesoproterozoic)

Medium bluish-gray fresh, weathers yellowish-gray; fine- to medium-grained; granoblastic to lepidoblastic; major mineral constituents are muscovite, biotite, quartz and feldspar; garnet poikiloblasts are 0.1 to 0.3 cm in diameter; strong foliation defined by discontinuous segregated layers, 0.3 to 0.5 cm thick, consisting of muscovite, biotite, and garnet separating 0.5 to 1.5 cm thick layers of quartz and feldspar; occurs as map-scale, presumably intrusive bodies within biotite granitic augen gneiss (Ybgg); Mesoproterozoic foliation preserved in the interior of the enclaves. A preliminary SHRIMP U-Pb zircon age is ~1.07 Ga (J. Aleinikoff, USGS, written comm., 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ybgg - Biotite granitic augen gneiss (Mesoproterozoic)

Medium bluish-gray fresh, weathers yellowish-gray; medium- to coarse-grained; granoblastic, porphyroclastic; major mineral constituents are quartz, feldspar, chlorite, muscovite and biotite, and hornblende; strongly foliated; protomylonitic to mylonitic, with porphyroclastic composite augen of quartz

and feldspar as much as 1 cm long, within anastomosing foliation comprised of muscovite, biotite and chlorite; unit intruded by metagranitoid (Zgm), and contains map-scale, presumably intrusive bodies of segregation-banded muscovite-biotite leucogneiss (Ymlg) and xenoliths of biotite leucogneiss (Yblg). Biotite granitic augen gneiss is the most areally extensive unit in the Fries thrust sheet; correlates with the Little River Gneiss (Dietrich, 1959) of the Horsepen Mountain Suite (Bartholomew, 1981). Bulk composition, augen, and xenoliths support a granitioid protolith. This tectonized metagranitoid may contain paragneisses (Bartholomew and others, 2000). A preliminary SHRIMP U-Pb zircon age is ~1.15 Ga (J. Aleinikoff, USGS, written comm., 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Ybqg - Blue-quartz gneiss (Mesoproterozoic)

Yellowish-gray fresh, weathers grayish-yellow; granoblastic to lepidoblastic to nematoblastic; consists of medium- to coarse-grained feldspar and distinctly pale-blue to grayish-blue quartz, fine-grained, epidote, fine- to medium-grained muscovite, biotite and chlorite, and hornblende; foliation defined by continuous segregated layers, 0.2 to 0.3 cm thick, of abundant epidote, chlorite, and biotite, separating 0.4 to 1.5 cm thick layers of quartz, feldspar and muscovite, with few large augen of grayish-blue quartz and feldspar aggregate porphyroclasts, as much as 4.5 cm long and 1.5 cm wide. A preliminary SHRIMP U-Pb zircon age is ~1.18 Ga (J. Aleinikoff, USGS, written comm., 2013). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Yblg - Biotite leucogneiss (Mesoproterozoic)

Greenish-black fresh, weathers olive-gray; medium- to coarse-grained; granoblastic to lepidoblastic; major mineral constituents are quartz, feldspar, hornblende, garnet, biotite, chlorite, and possibly pyroxene; massive to foliated; layered and cross-cut by numerous medium-grained, granoblastic leucosomes of quartz and feldspar, giving the rock a migmatitic appearance locally. Biotite leucogneiss occurs as map-scale xenoliths within biotite granitic augen gneiss (Ybgg), consistent with a preliminary SHRIMP U-Pb zircon age of ~1.19 Ga (J. Aleinikoff, USGS, written comm., 2013); contacts are generally concordant with enclosing gneiss. Bartholomew and others (2000) suggest biotite leucogneiss is correlative with Sandy Creek Granulite Gneiss (Henika, 1997, 2000a). (*GRI Source Map ID 76039)* (Blue Ridge Parkway Bedrock North).

Photographs

All geologic photograph localities present in the GRI digital geologic-GIS data, in the Geologic Observation Localities (blrngol) feature class/data layer, have an associated photograph that is presented in this document. Each photograph is denoted by a location ID (e.g., AV-2), and corresponds to a locality in the GIS data with the same location ID. A brief figure caption, derived from the source file name, is listed with each photograph.

AV-2

View to southeast of Onion Mountain. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

AV-6

Layered charnockitic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

AV-7

Garnetiferous leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

AV-8

Fine-grained garnetiferous leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

AV-14

Fine-grained felsic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

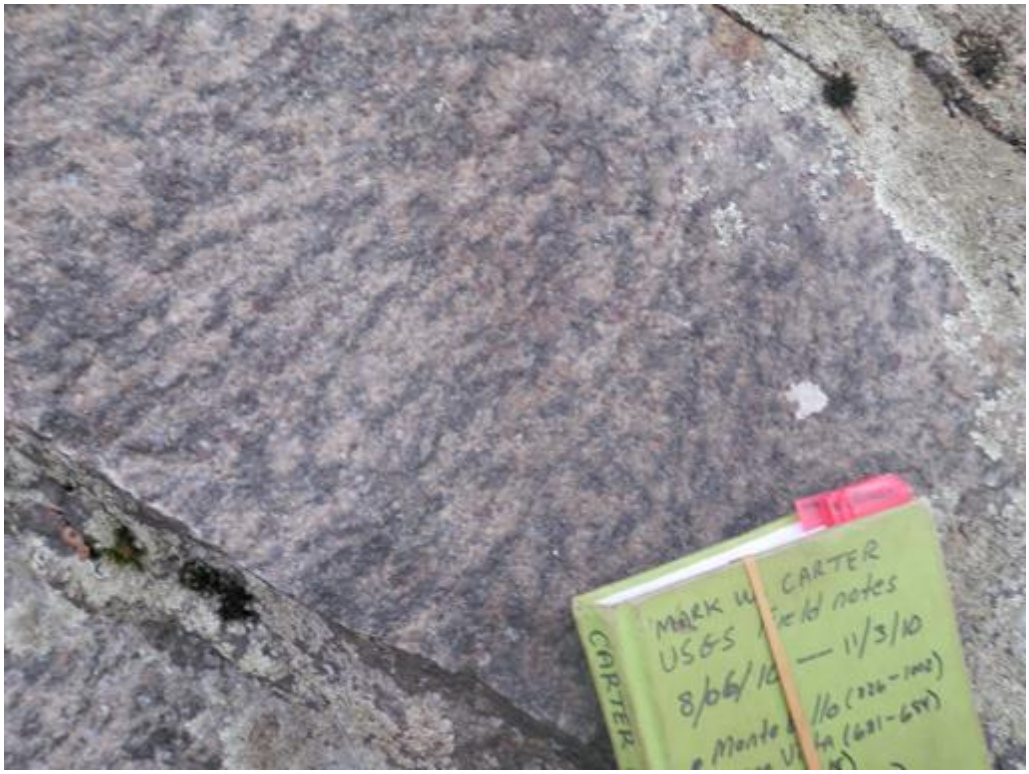
AV-15

Medium-grained leucocharnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

AV-16

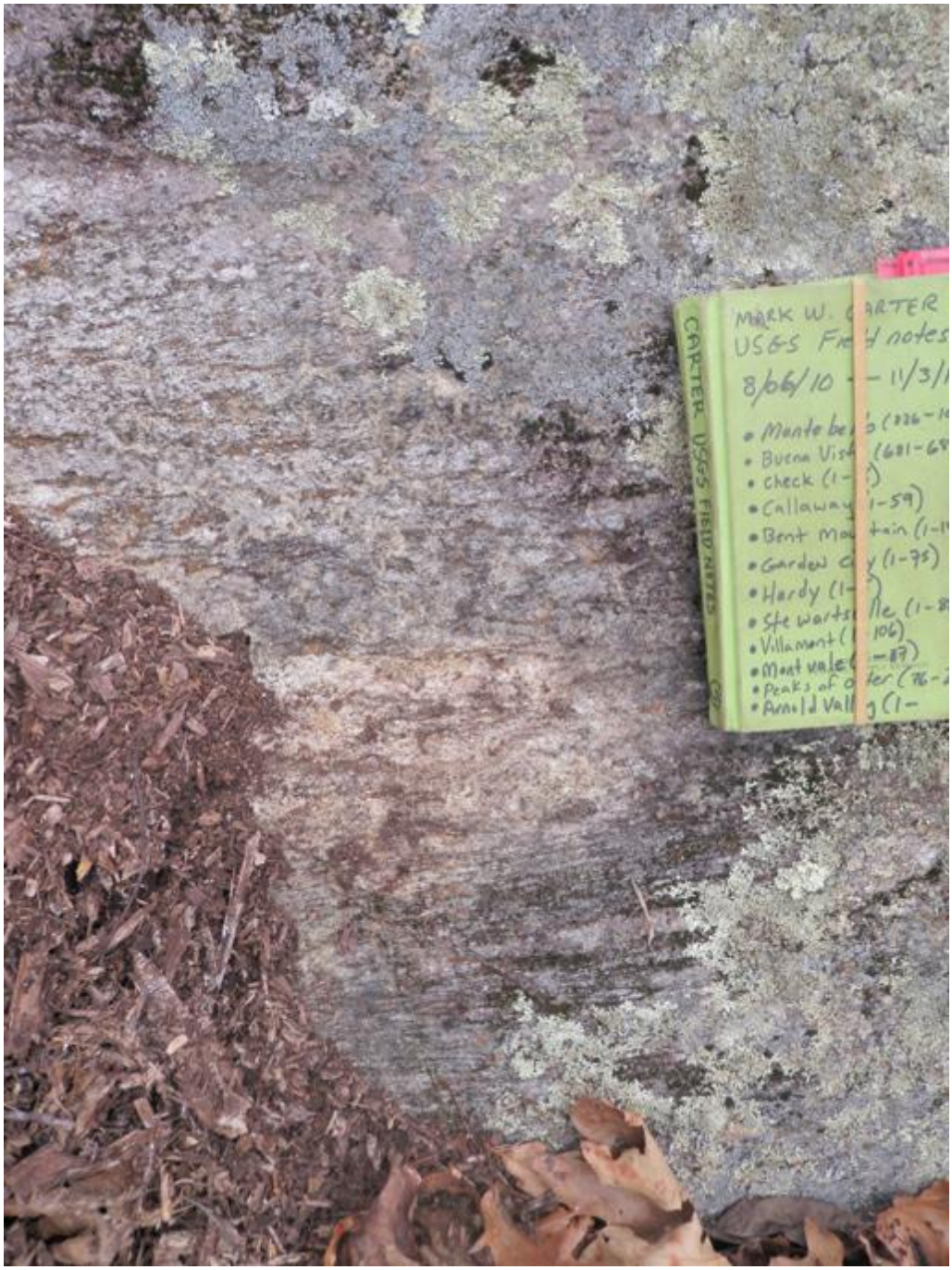
Felsic pin-striped gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

AV-25



Garnetiferous leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

AV-33



Interlayered garnet-bearing leucogneisses. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

AV-34

View. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

AV-42

Well layered leucocharnockitic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

AV-43

No caption provided. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

AV-49

Hopper Creek Valley. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

AV-53

Coarse-layered porphyroclastic leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

AV-58

Folded layering in garnetiferous gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-7

Bedding. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-10

Mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-11

Mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-14

Lineation. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-16

Coarse-grained mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

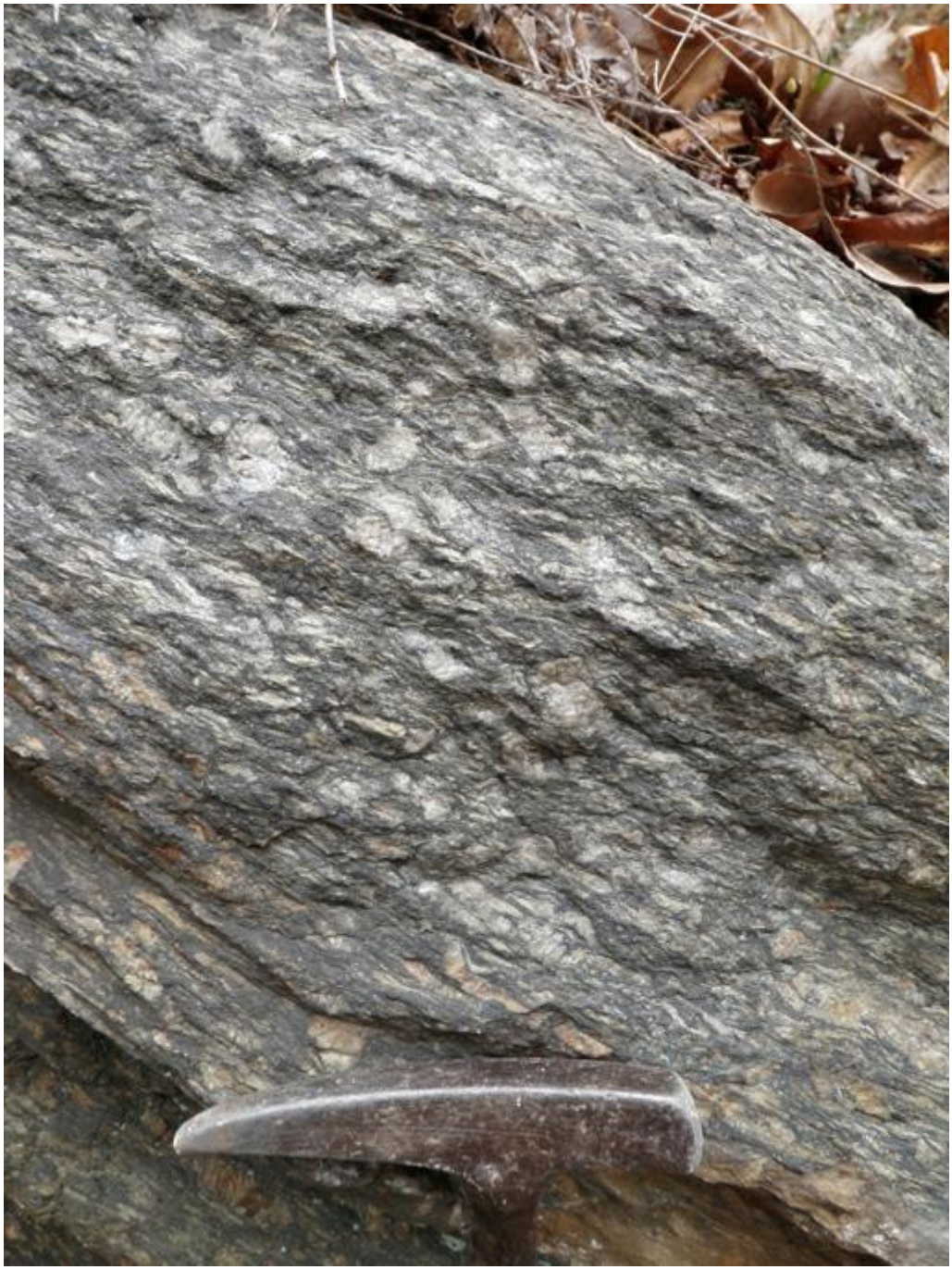
BI-17

Blue quartz mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-31

Coarse-grained mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-33



Coarse-grained mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-44

Banded siltstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-49

F1 fold. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-62

F1 fold. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-90

Basement-sed contact. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-98

Mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

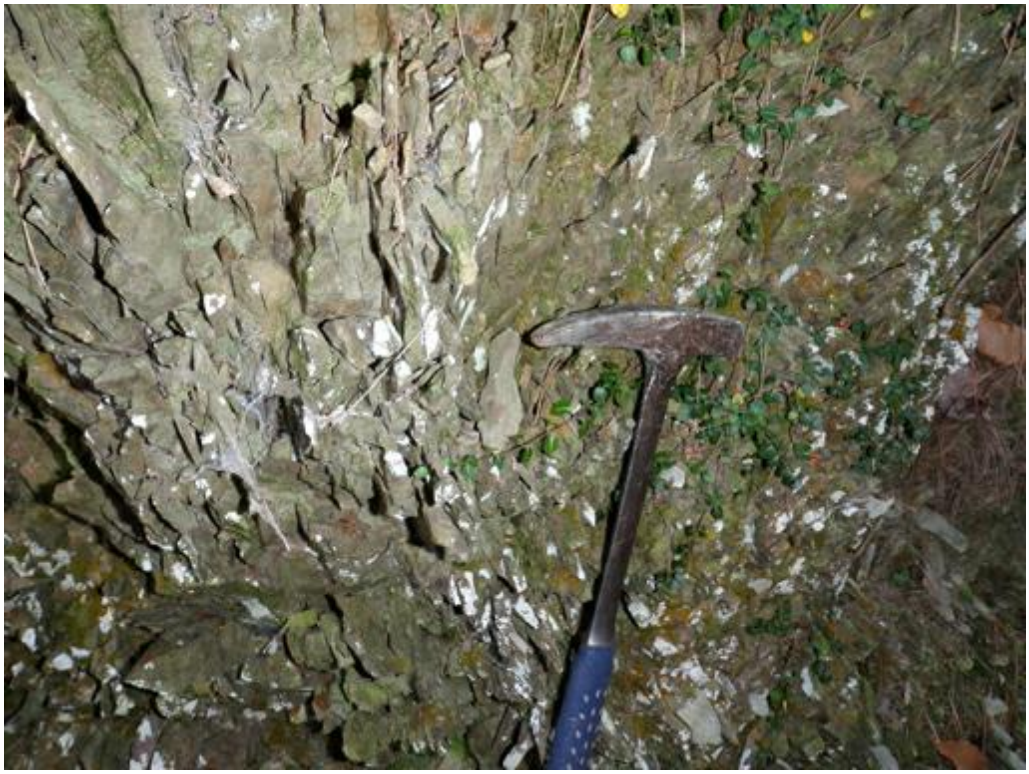
BI-101

Coarse-grained mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-118

Crenulated banded slate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-119



Pencils. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-138

Gritty graywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-156

Bedding in sandstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-164

Transposed bedding. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-172

F2 fold. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-191

Bedding-cleavage. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-275

Mylonite foliation. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-276

Rodding in mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

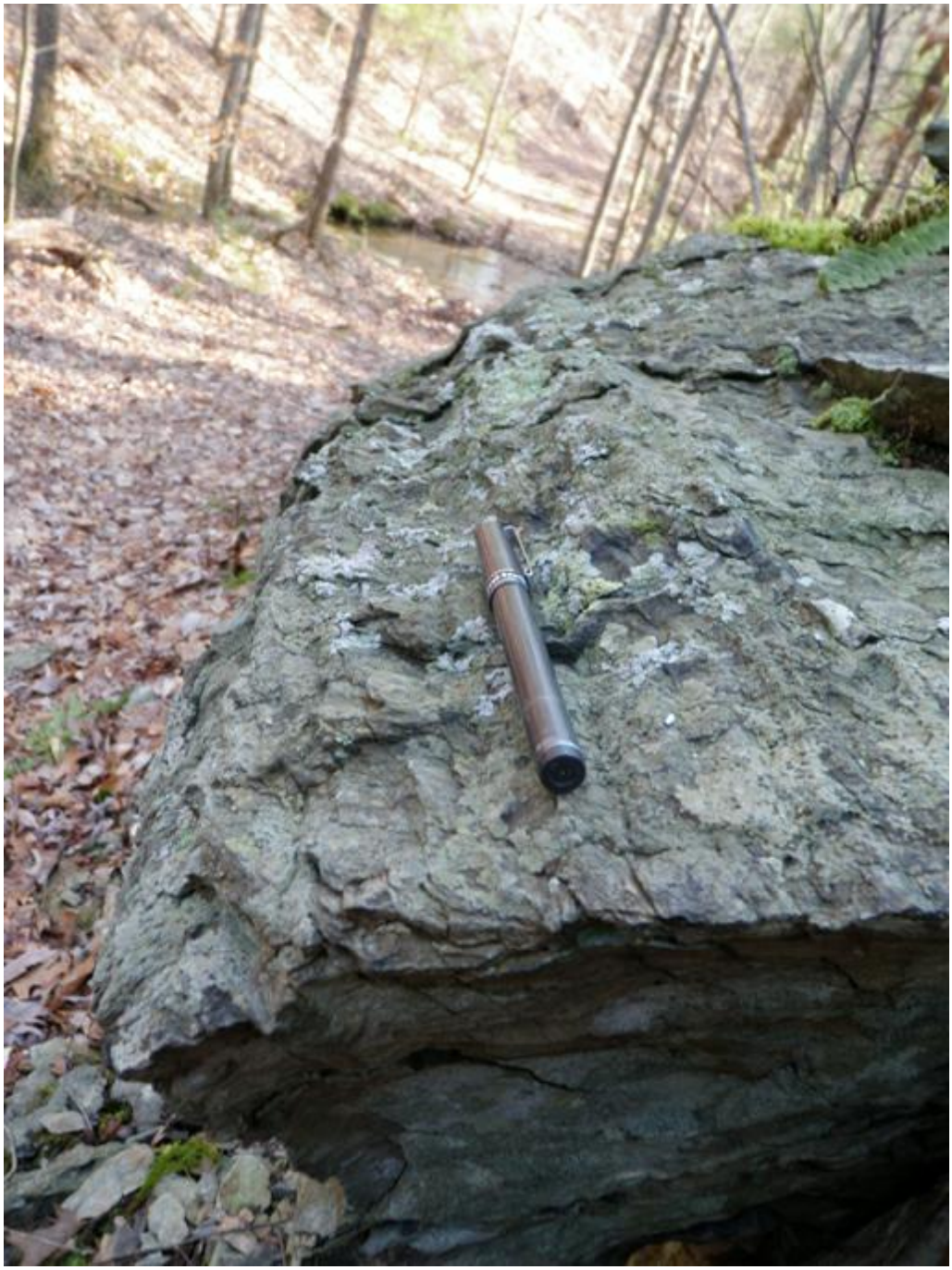
BI-343

F1 fold. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-395

F1 fold. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-397



Crenulations. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-401

Intersection lineation. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-402

F2 folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-424

Purple graywacke and conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-446

Basement-sediment contact. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-457

Pin-striped gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-458

Pin-striped gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-473

View of Thunder Ridge. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

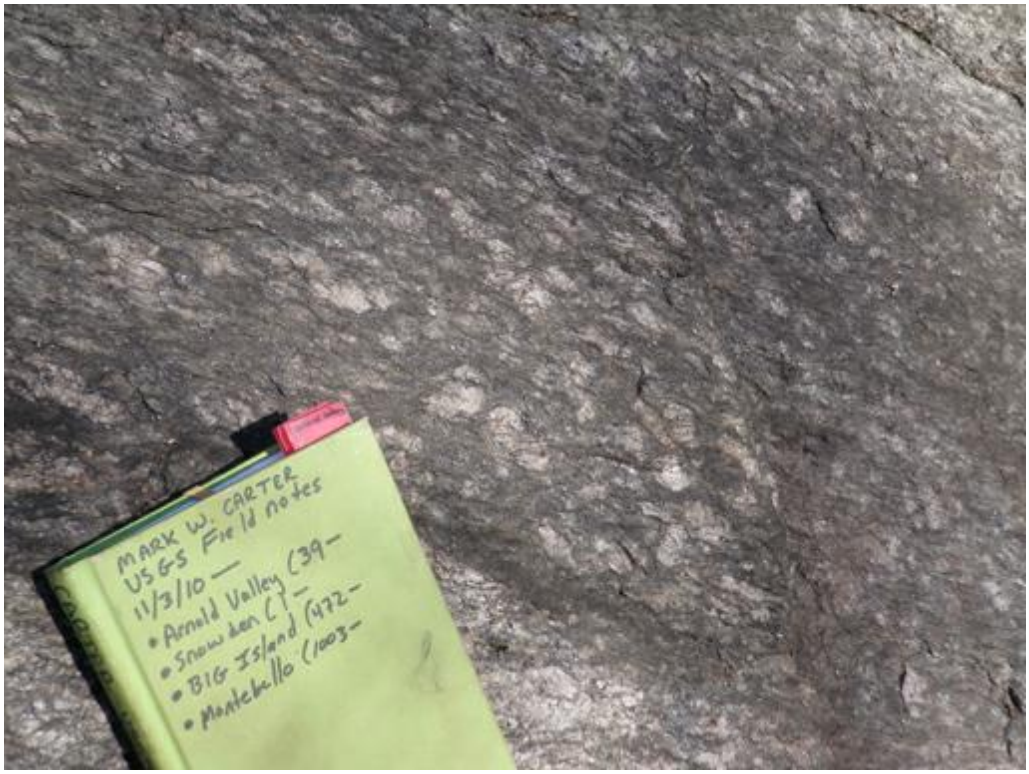
BI-492

Violet quartz in mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-556

Megacrystic protomylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BI-559



Megacrystic protomylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-37

S0-S1 in Unicoi. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039)*

BL-41

Fault in Unicoi. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-52

F2 folds in Harpers. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-83

Purple tuffaceous Unicoi. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-84

Purple rhythmites in Unicoi. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-85

Purple conglomerate in Unicoi. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-89

Strat relationships. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-93

Conglomerate-greenstone contact. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-185

Pillows in basalt. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-213

Coarse to megacrystic quartz feldspar monzonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-309

Overturned thin banded sandstone and quartzite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-314

Thin banded sandstone and quartzite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-316

Colluvial cut. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-369

Scree slope in Antietam quartzite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

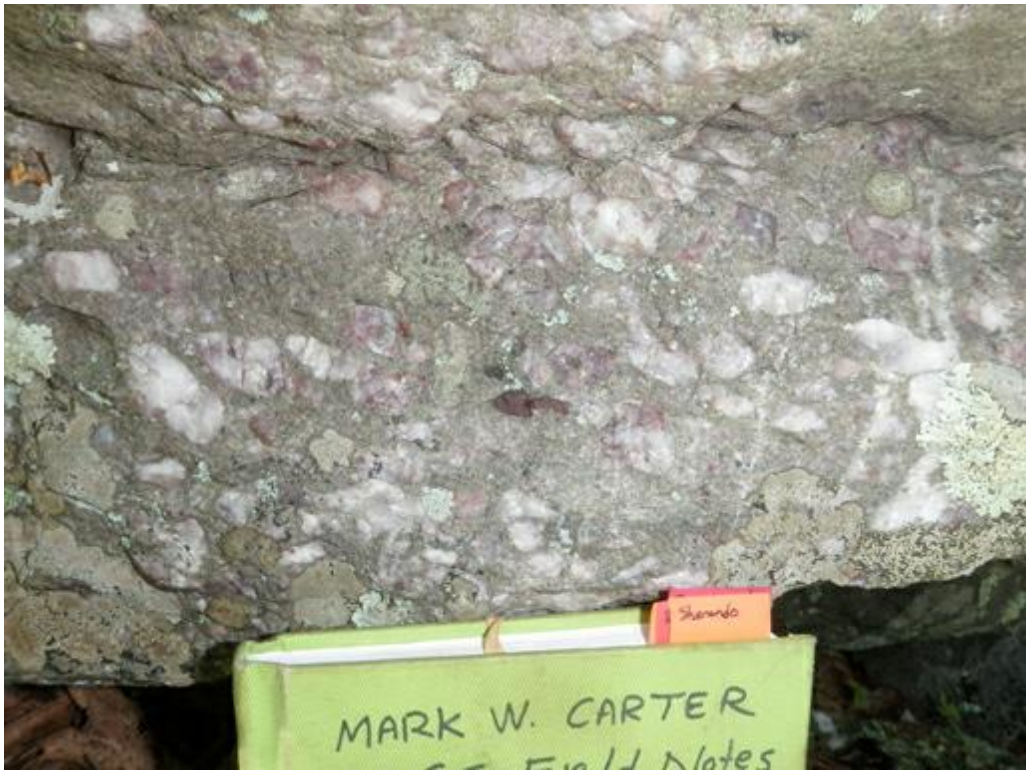
BL-382

Quartz pebble conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-392

Quartz pebble conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-394

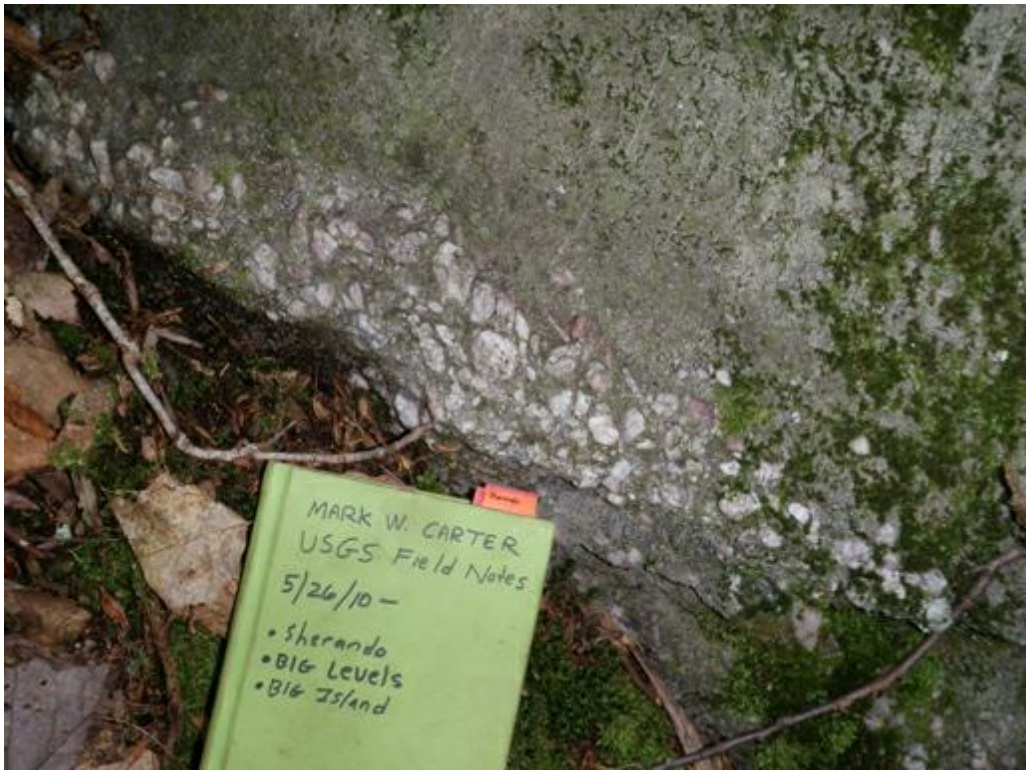


Quartz pebble conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-399

Cross-bedded pebbly quartzite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-413



Quartz pebble conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-415

Quartz pebble conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-416

Bedding-cleavage relationships. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-418

Quartzite cliffs. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-424

Megacrystic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

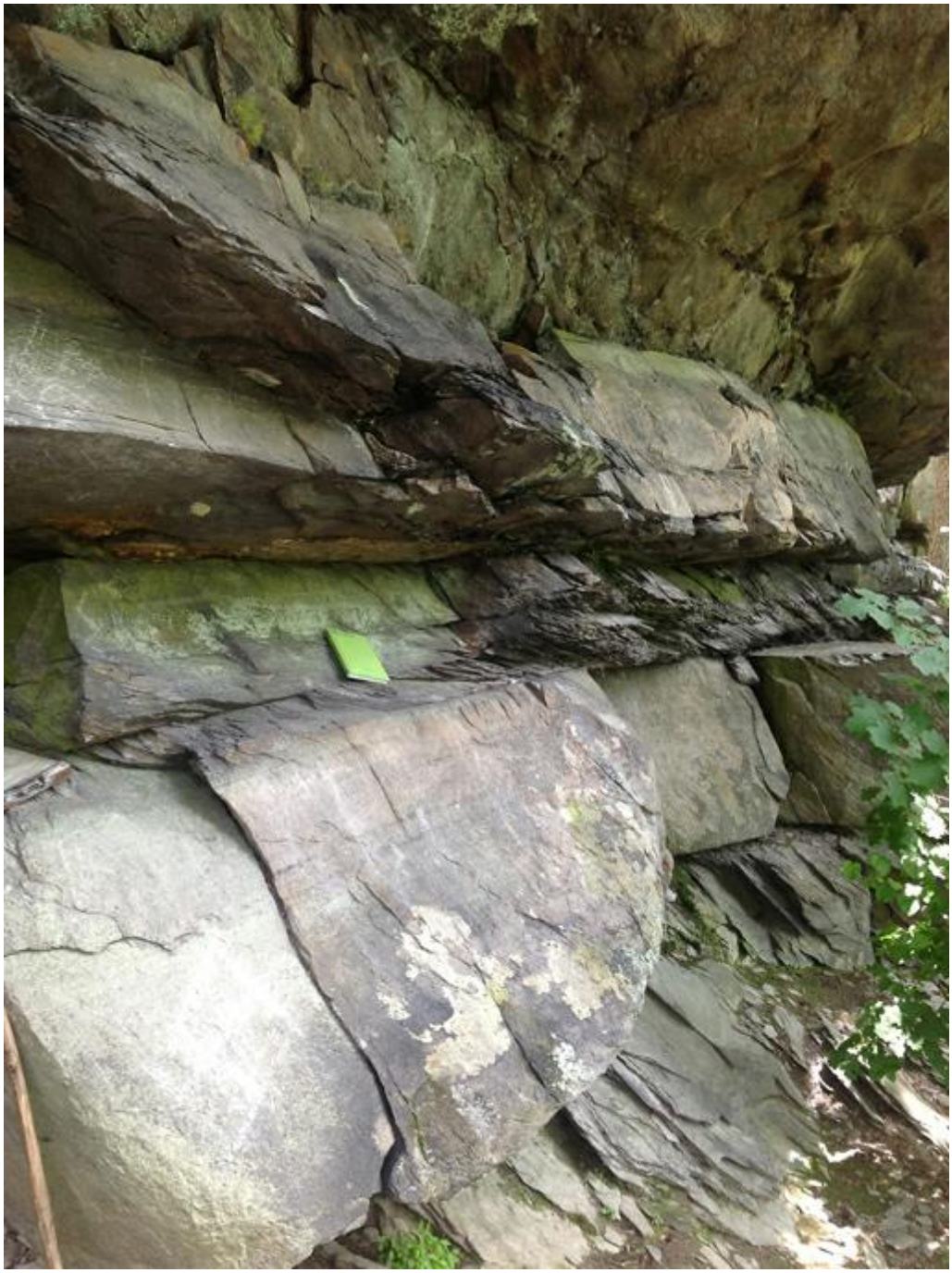
BL-439

Stratified clay. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-719

Skolithos. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-764



Bedded granule quartzite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BL-872

Small faults offsetting graywacke beds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

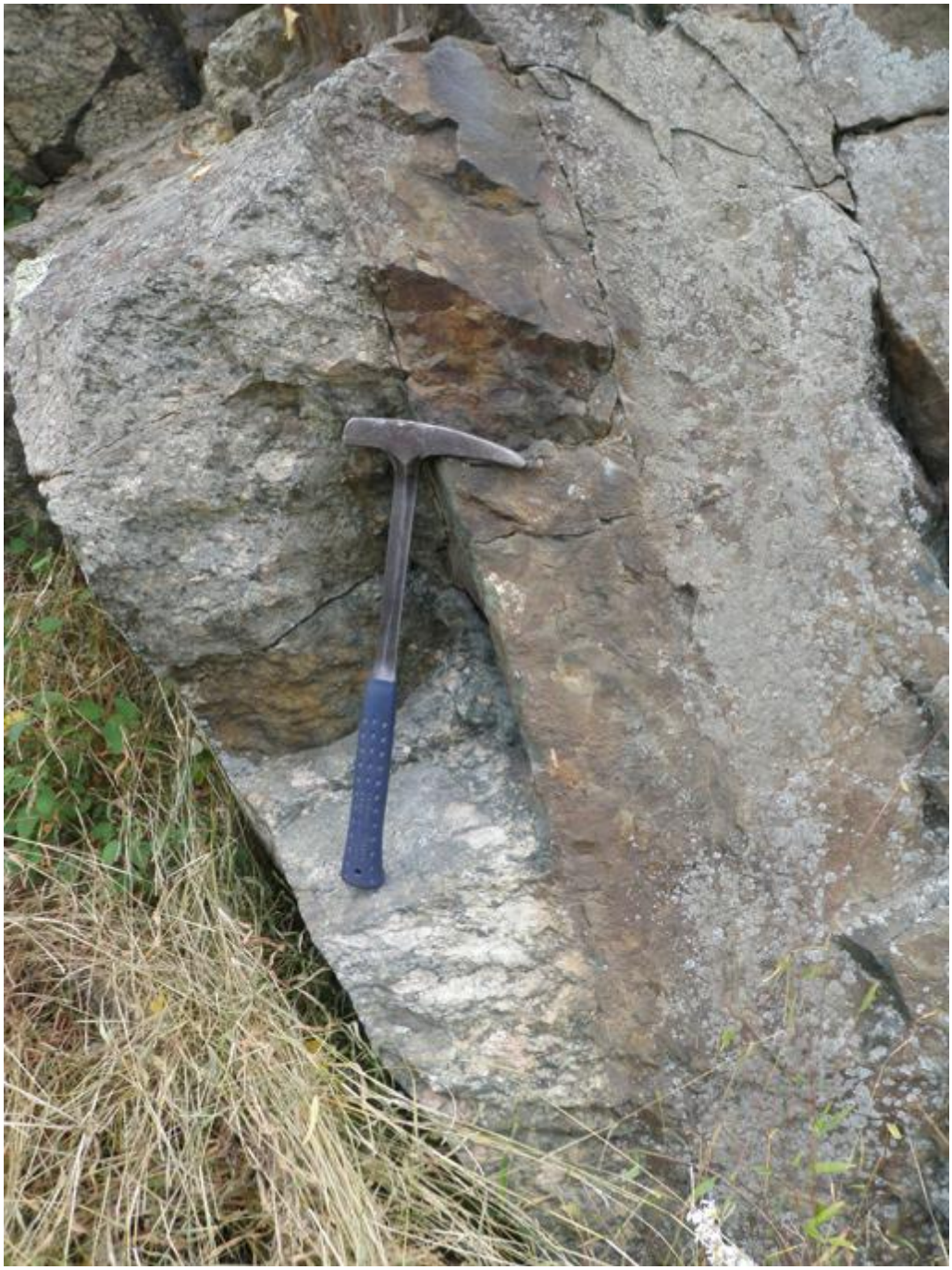
BL-901

Rhyolite dike. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BM-51

Metabasalt dikes cross-cutting megacrystic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BM-53



Metabasalt dike cross-cutting megacrystic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BM-55

Megacrystic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BM-72

Foliation in megacrystic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BM-89

Mylonitic megacrystic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BM-104

Megacrystic granitoid cut by quartz-feldspar dike. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BM-115

Mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-31

Old layering. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-52

Old ductile foliation. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-62

Old layering. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-72

Leucogneiss with nelsonite dike. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-77

Folded layering in leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-88

Spotty leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-97

Garnetiferous leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-122

F1 fold. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

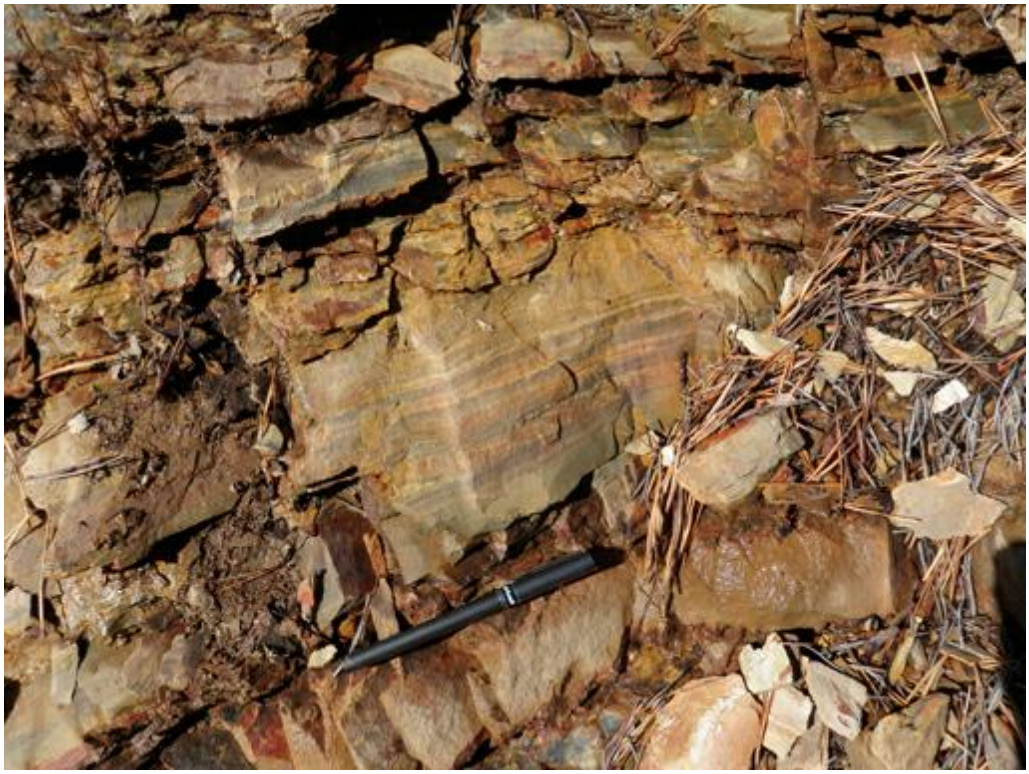
BV-123

Banded siltstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-125

F2 folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-134



Banded siltstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-135

F1 fold. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

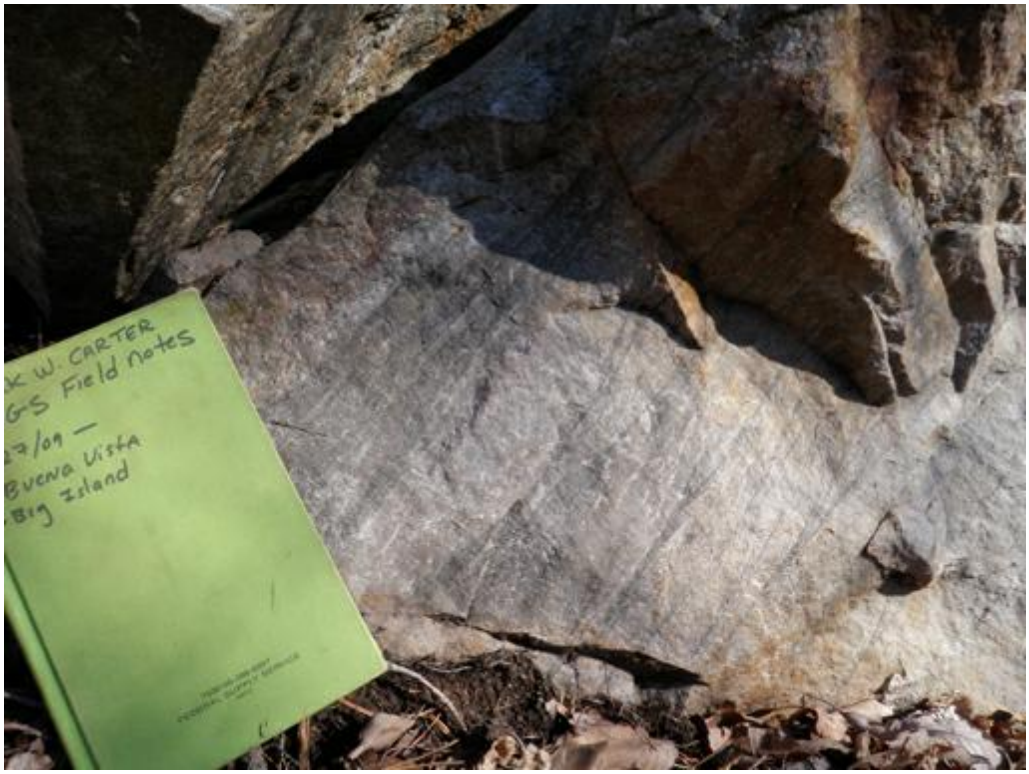
BV-136

Bedded sandstones. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-139

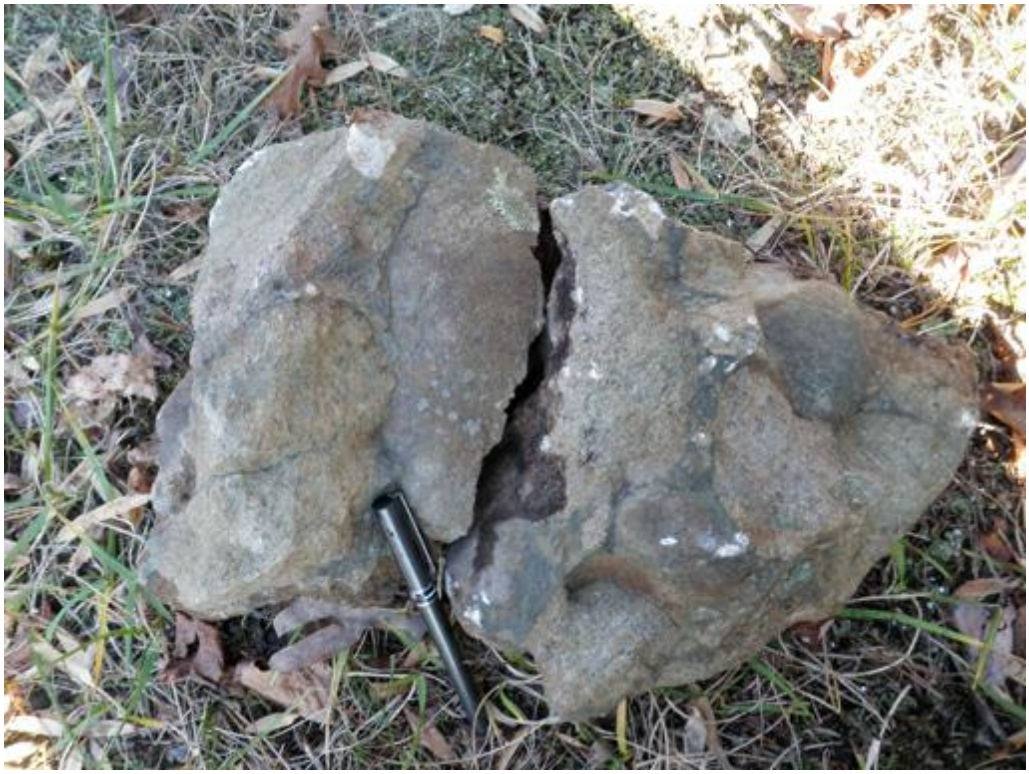
Banded sandstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-167



Cross-bedded quartzite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-169



Conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-212

Foliation in coarse leucogranitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

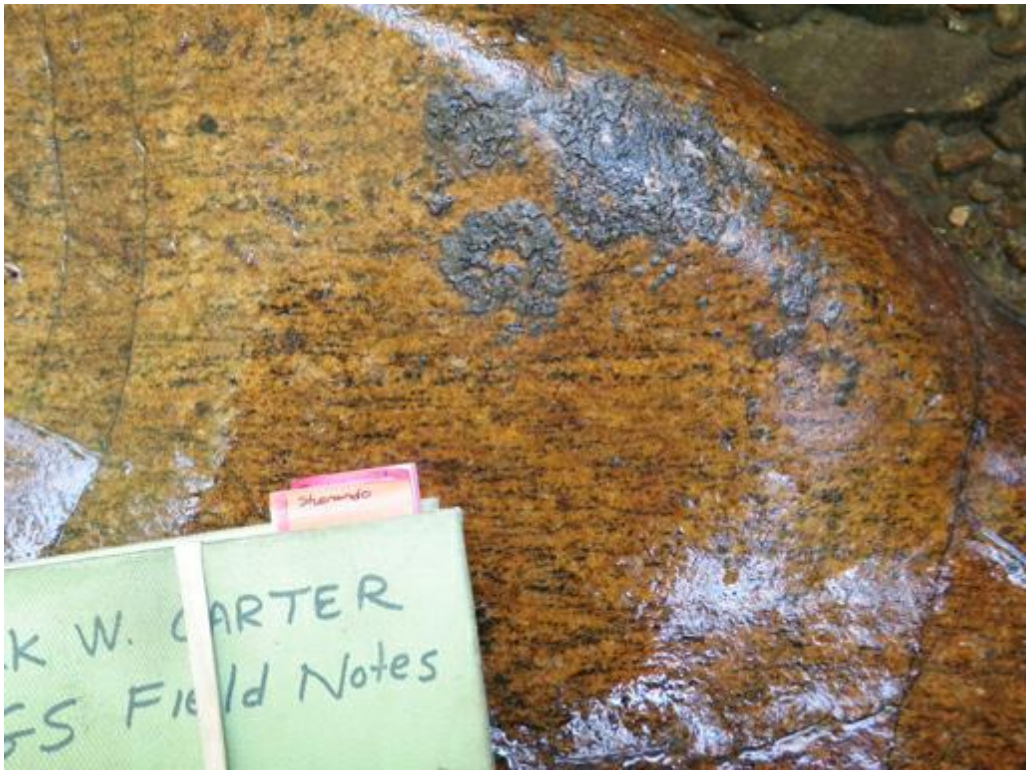
BV-248

Whispy leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-249

Spotty leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-260

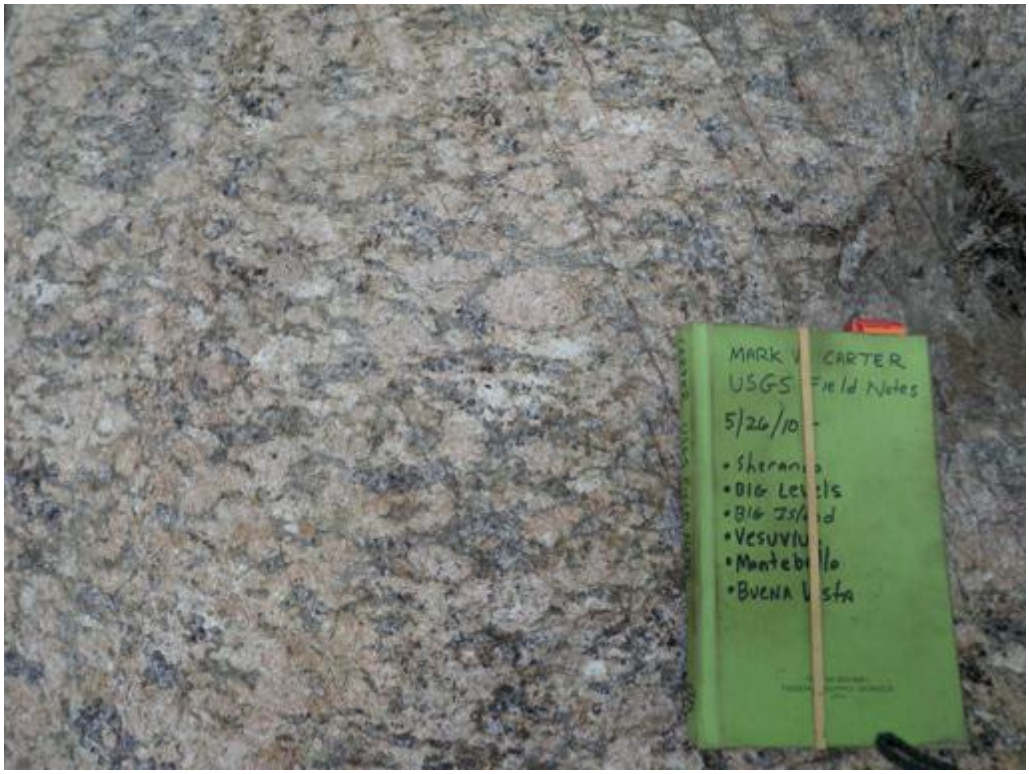


Whispy leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-289

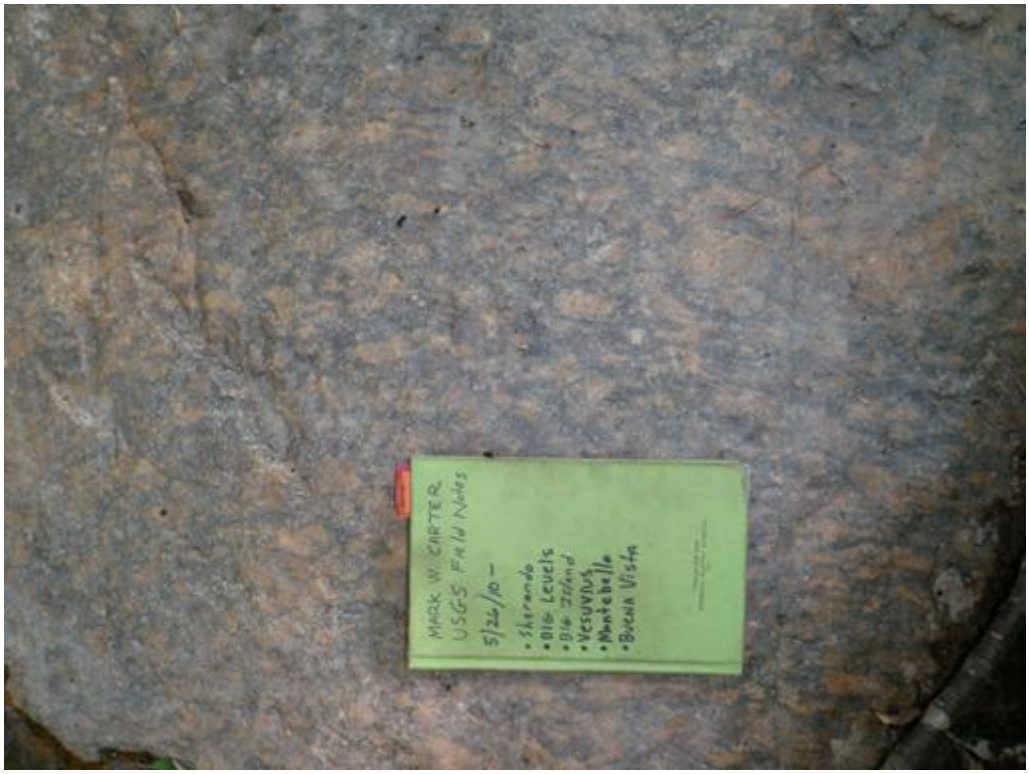
Megacrystic layered felsic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-290



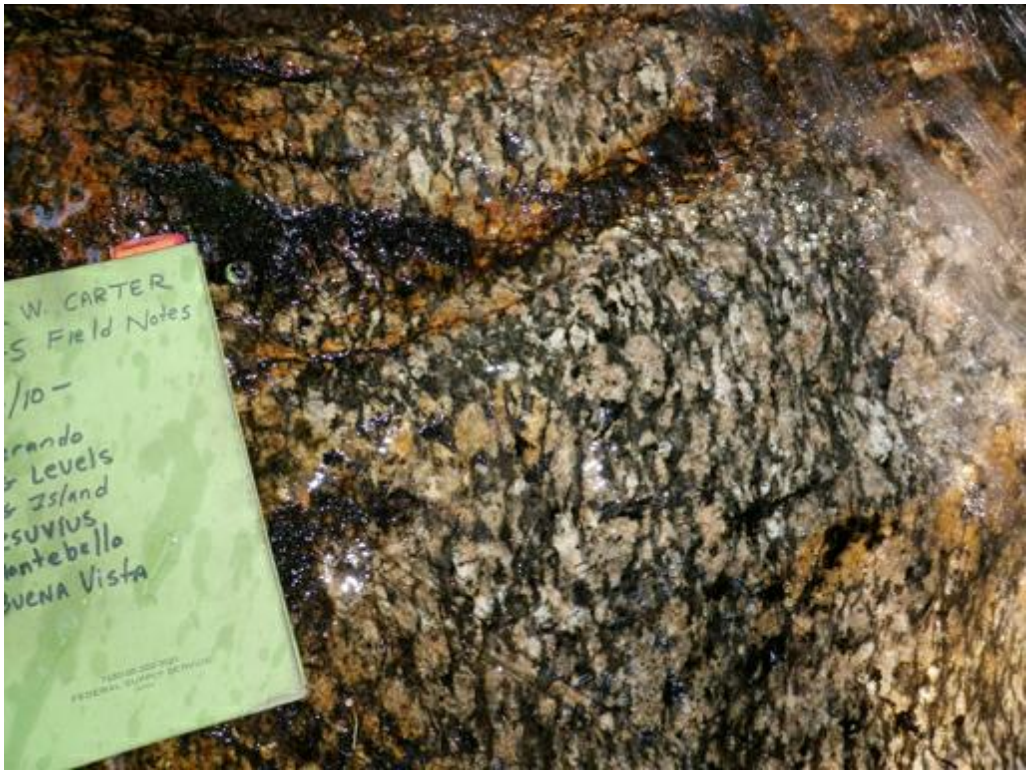
Brittle fractures in megacrystic layered felsic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-292



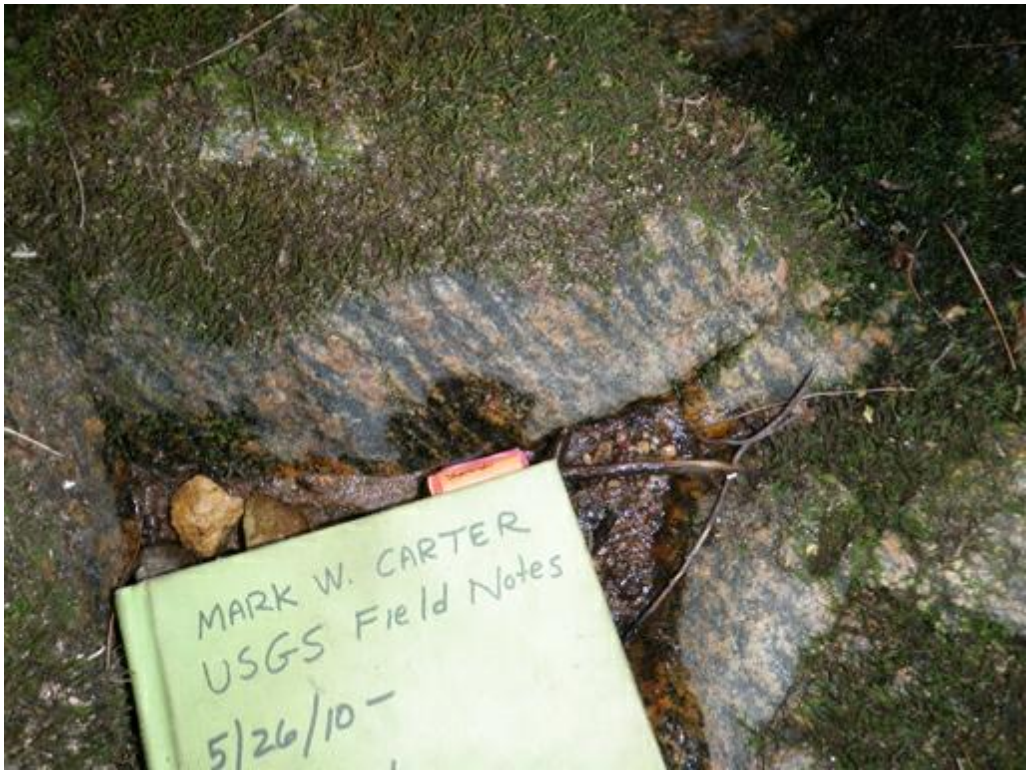
Megacrystic layered felsic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-295



Megacrystic layered felsic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-301



Irish Creek-type megacrystic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-307

Megacrystic leucogranitoid gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-339

Irish Creek-type gneiss cut by charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-343

Statons Creek-type gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-368

Folded pin-striped gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-373

Statons Creek-type gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

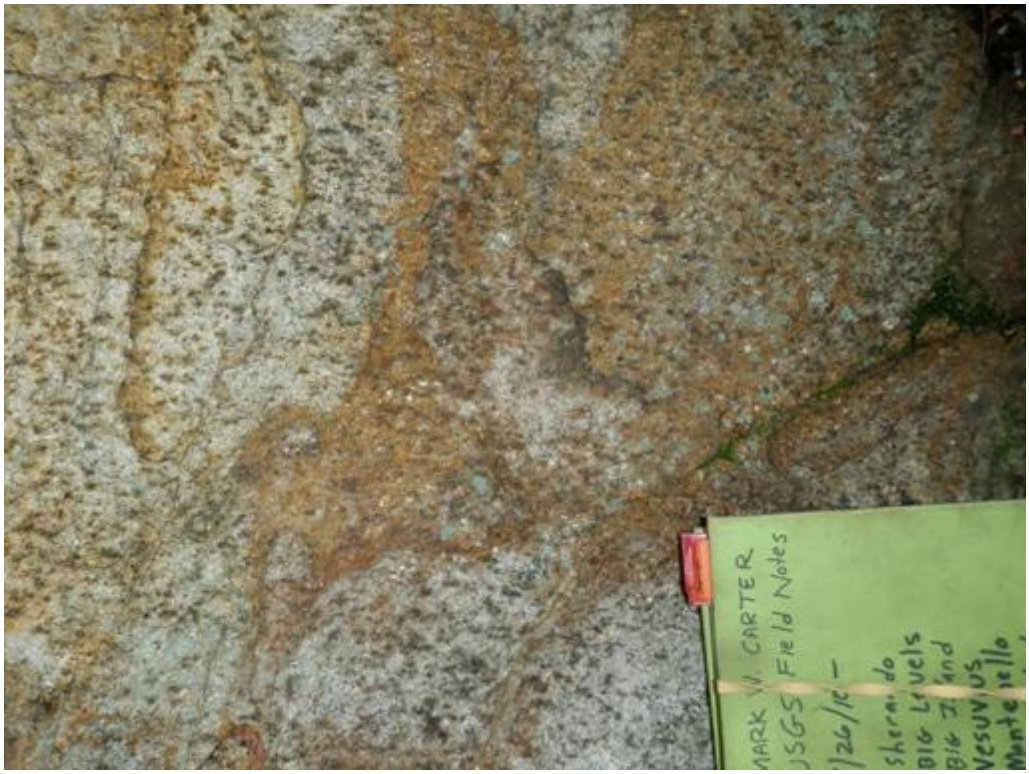
BV-375

Basement-sediment contact. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-381

Spotty leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-382



Biotite spotty leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

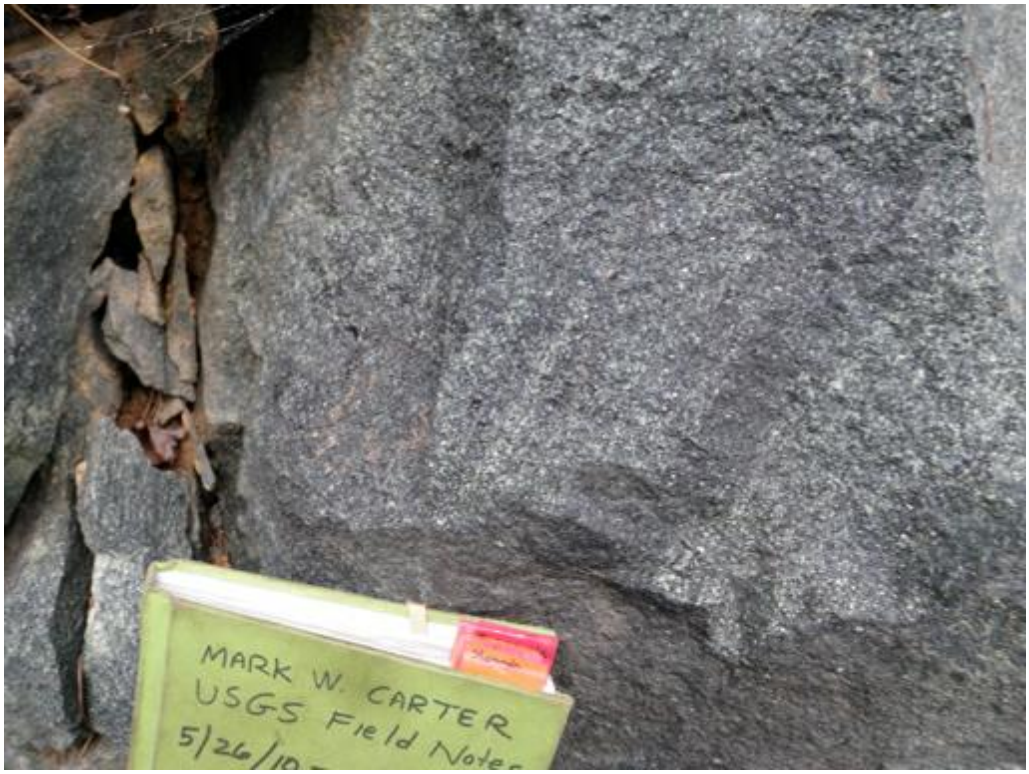
BV-391

Biotite spotty leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-424

Purple banded mudstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-426



Melanocratic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-437

Melanocratic pin-striped gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-438

Melanocratic pin-striped pyroxene granulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

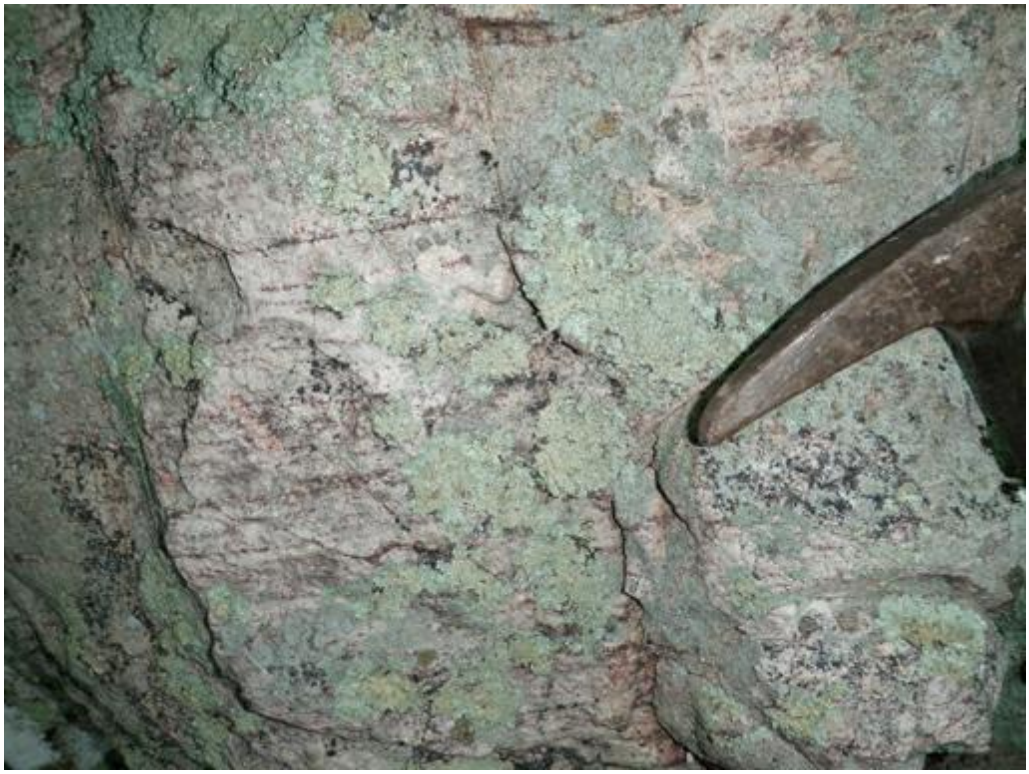
BV-439

Melanocratic pin-striped pyroxene granulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-514

Megacrystic quartz-feldspar leucogranitoid gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-515



Garnetiferous spotty gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

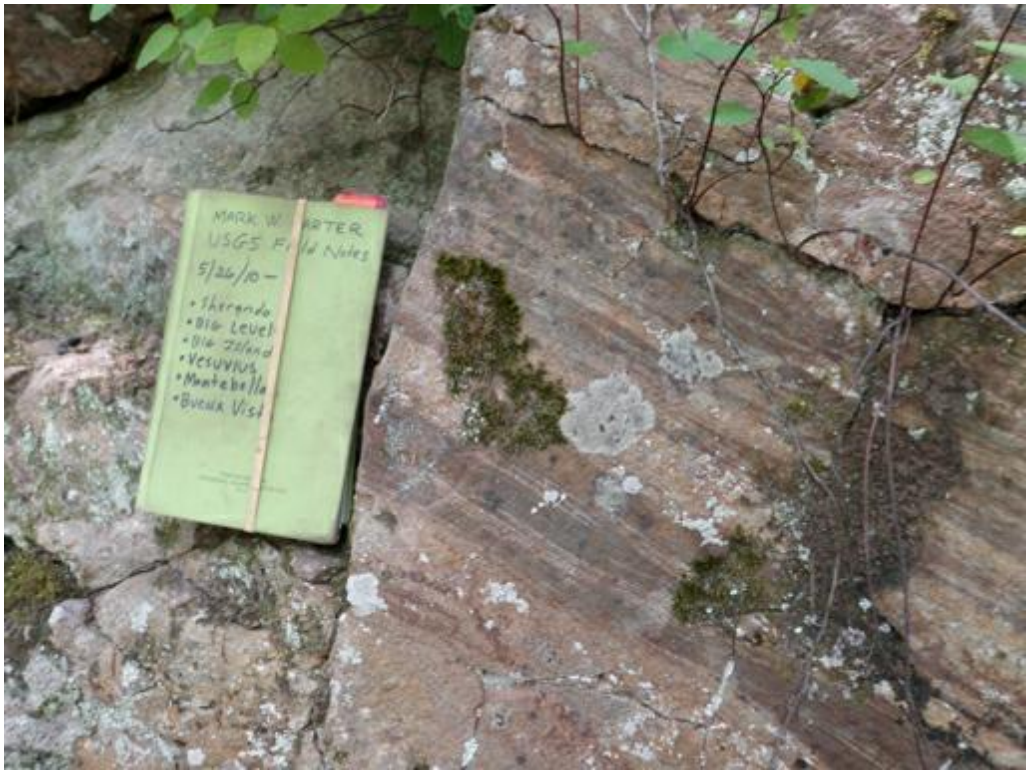
BV-516

Garnetiferous spotty gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-522

Spotty leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-525

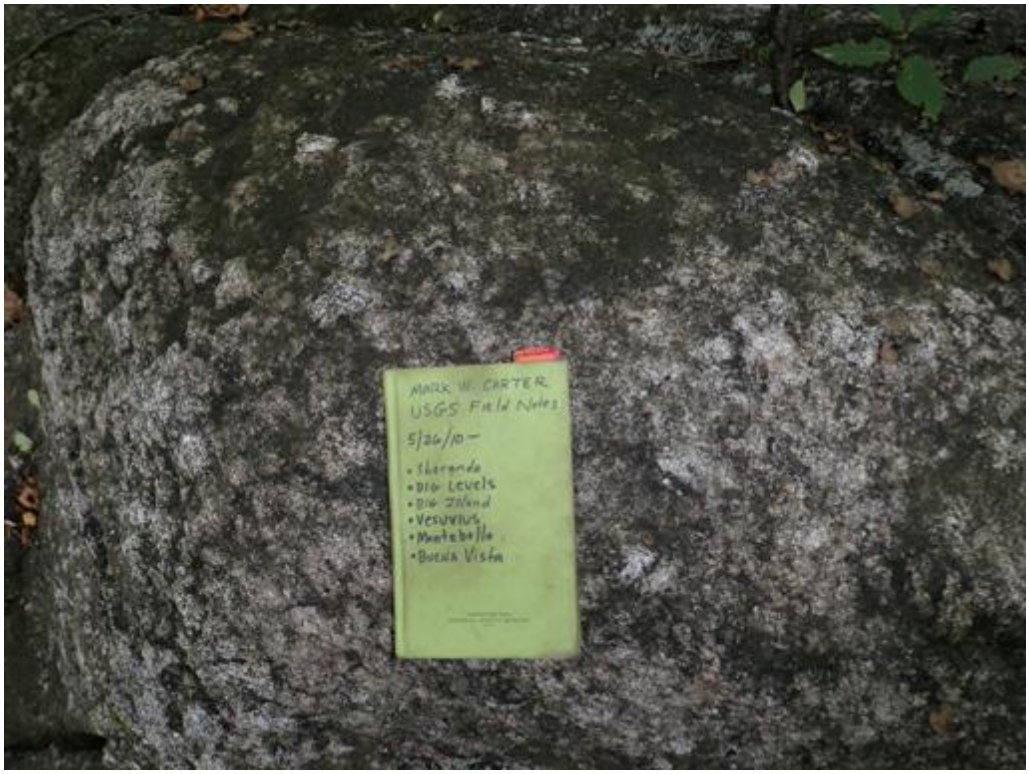


Iron-cemented sandstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-530

Contact between basement and Chilhowee. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-556

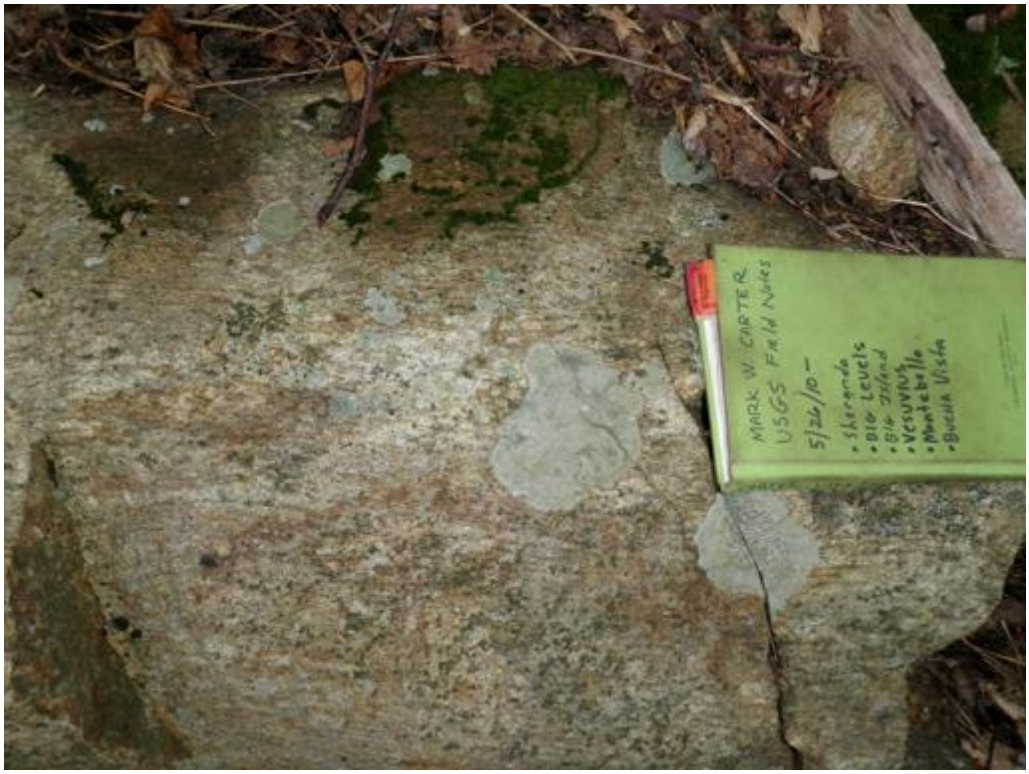


Megacrystic leucogranitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-573

Thin-banded sandstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-576



Leuco-weathered pin-striped gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-596

Scree slope. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-621

Intersection lineation in black banded slate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

BV-678

Ottie Cline Powell marker. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CB-13

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CB-17

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CB-29

Folds and quartz vein. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CB-31

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CB-35

Isoclinal folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CB-36

Garnetiferous biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CB-51

Talc-amphibole gneiss in Carndinal Stone Co quarry. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CB-52

Cardinal stone quarry. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CB-53

Two foliations in talc-amphibole gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CB-54

Big spring. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

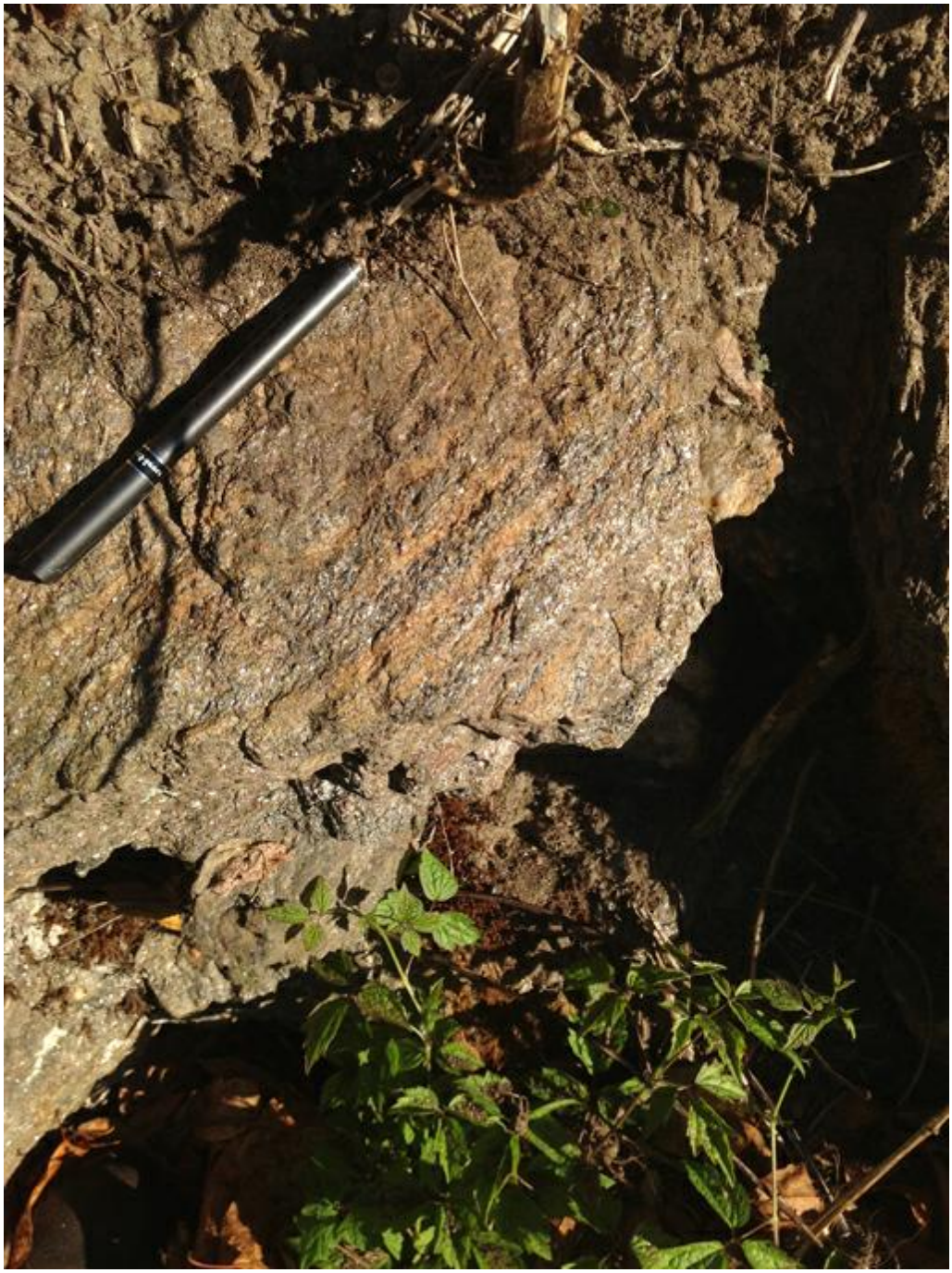
CB-69

Cleavage in pin-striped mica gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CB-71

Flattened pebbles or boudinaged quartz vein in garnet-mica schist. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CB-133



Two foliations in garnet-mica gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CB-136

Crazy folded pin-striped gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

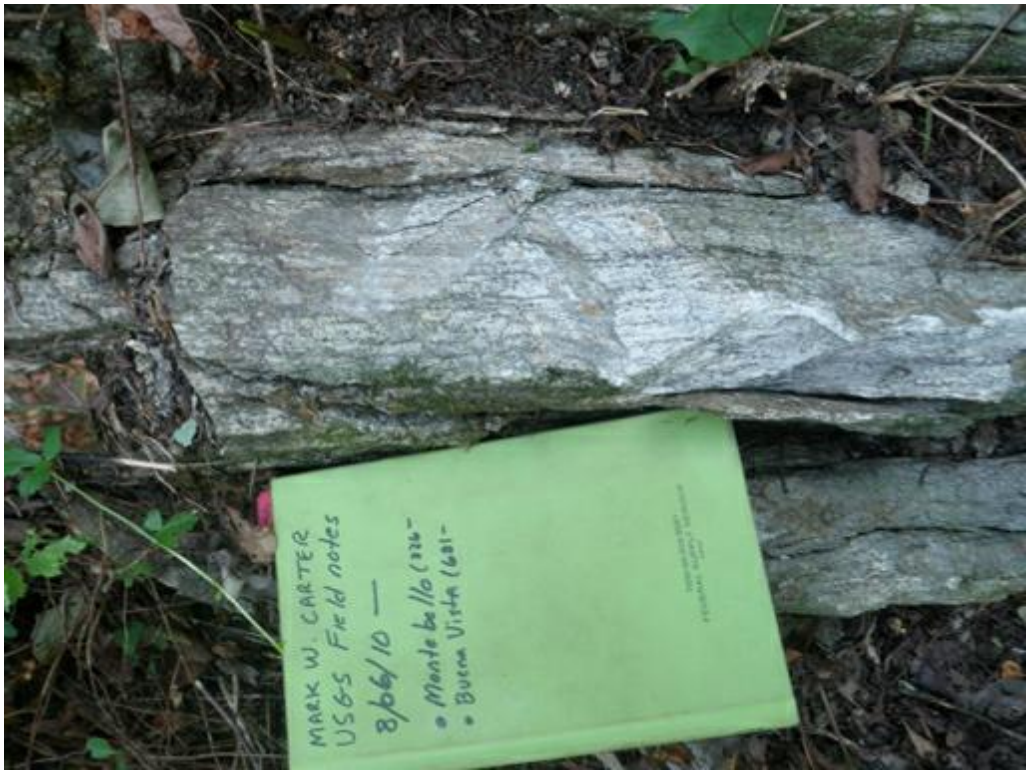
CK-10

Well-layered granulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CL-8

Folded quartz veins in metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CL-26



Layered biotite felsic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CL-33

Well foliated biotite felsic granitoid gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

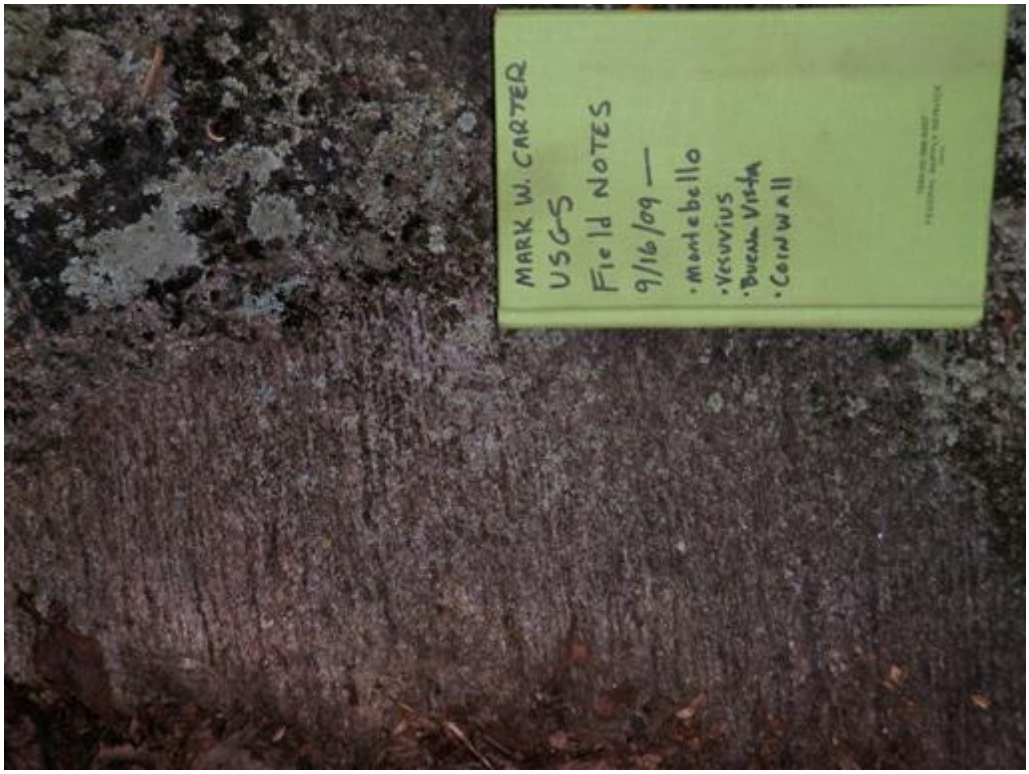
CL-46

Mylonite in biotite felsic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CL-47

Mylonitic leucocratic augen gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-13



Pin-striped granulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-27

Leucogranulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-36

Graywacke and purple rhythmite contact. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-38

Purple metavolcaniclastic rock. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

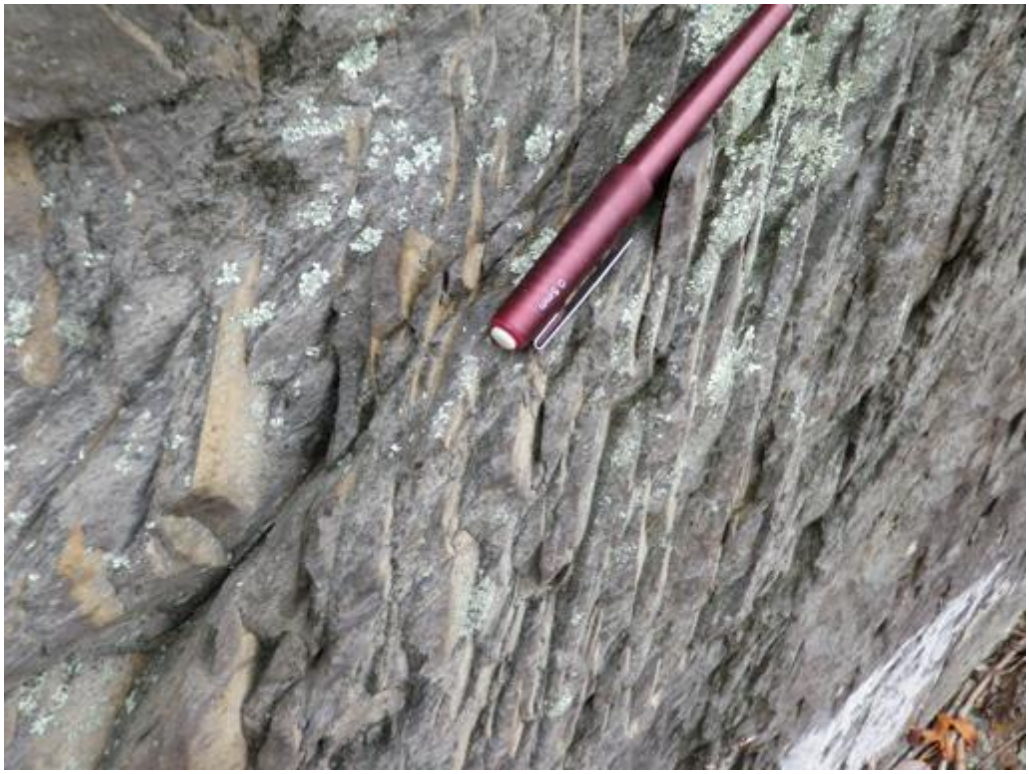
CW-39

Purple rhythmites. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-41

Purple rhythmites. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-71

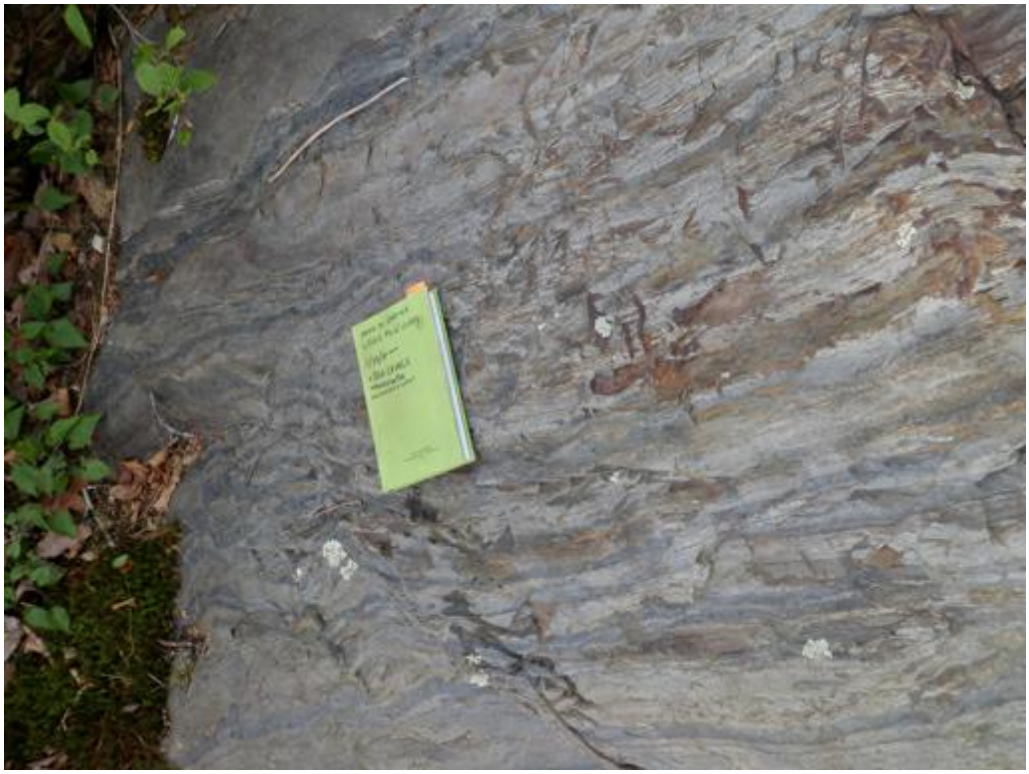


Bedding-cleavage. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-75

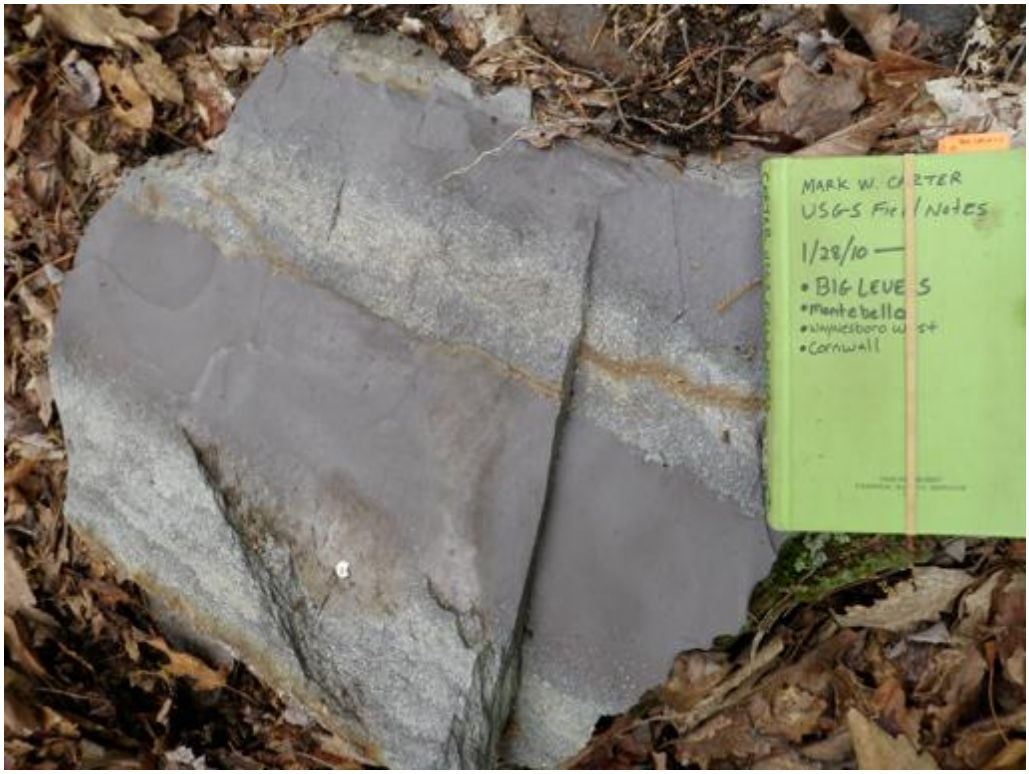
Bedding-plane fault in Chilhowee Group. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-81



Bedding in sandstone-siltstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-88



Purple banded sandstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-102

Coarse layered leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

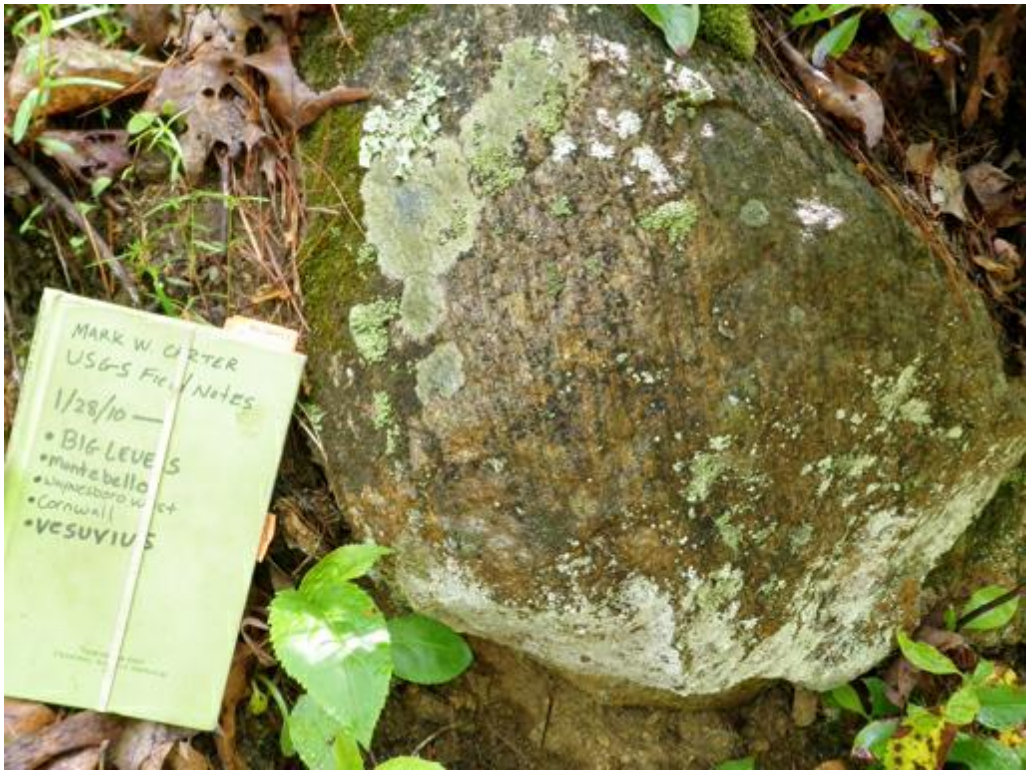
CW-115

Coarse layered megacrystic mesogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-135

Coarse layered mesogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-136



Whispy leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-138

Coarse layered mesogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-141

Pin-striped gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-168

Spotty gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-169

Coarse spotty gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-170

Megaporphyry block. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-183

Layered mesogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-198

Sheared and unakitic layered mesogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-209

Coarse layered megacrystic mesogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-211

Fault breccia. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-212

Fault breccia. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-218

Wispy leucogranulite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-219

Ductile deformed Irish Creek granulite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-221

Mylonitic graywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

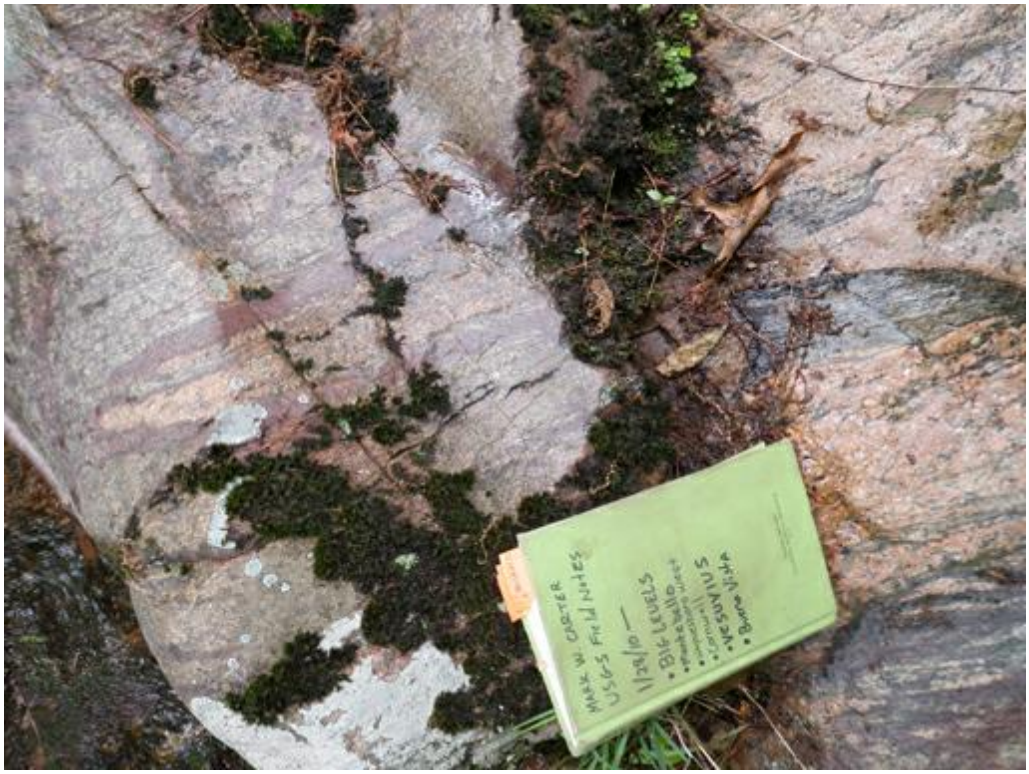
CW-223

Striped granulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-224

Striped granulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-225

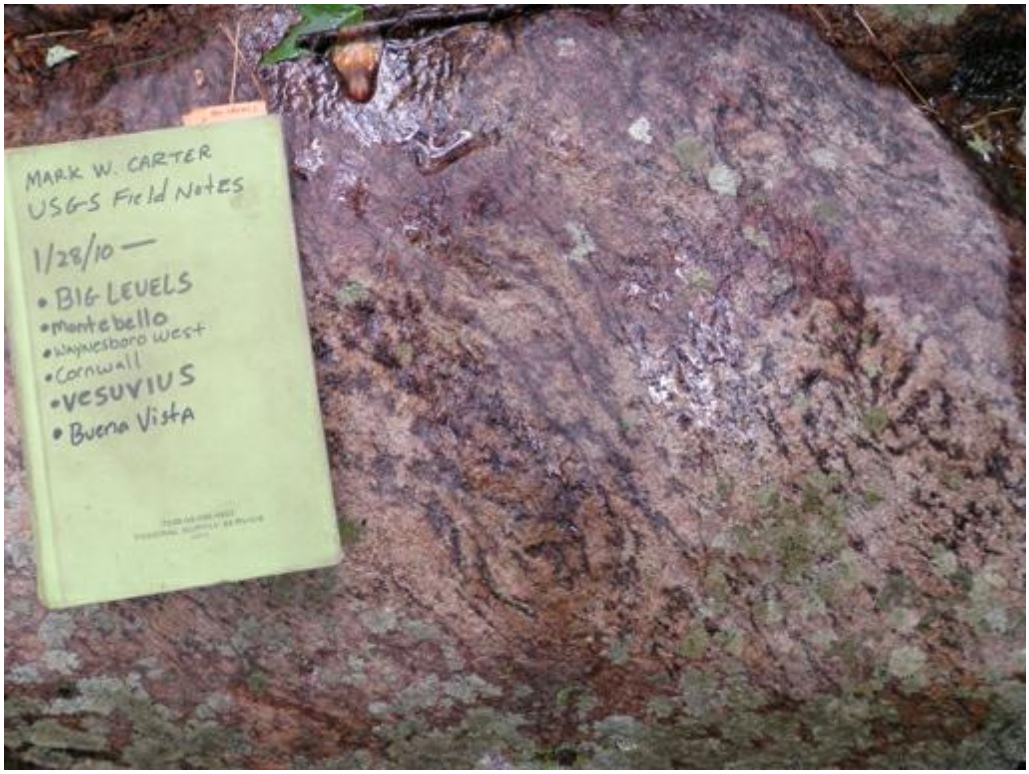


Striped granulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-229

Boulder conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-231



Whispy leucogranulite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

CW-286

Skolithos. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

EN-22

F2 folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

EN-25

S0-S1 relationship. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

EN-67

Isoclines in foliation. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

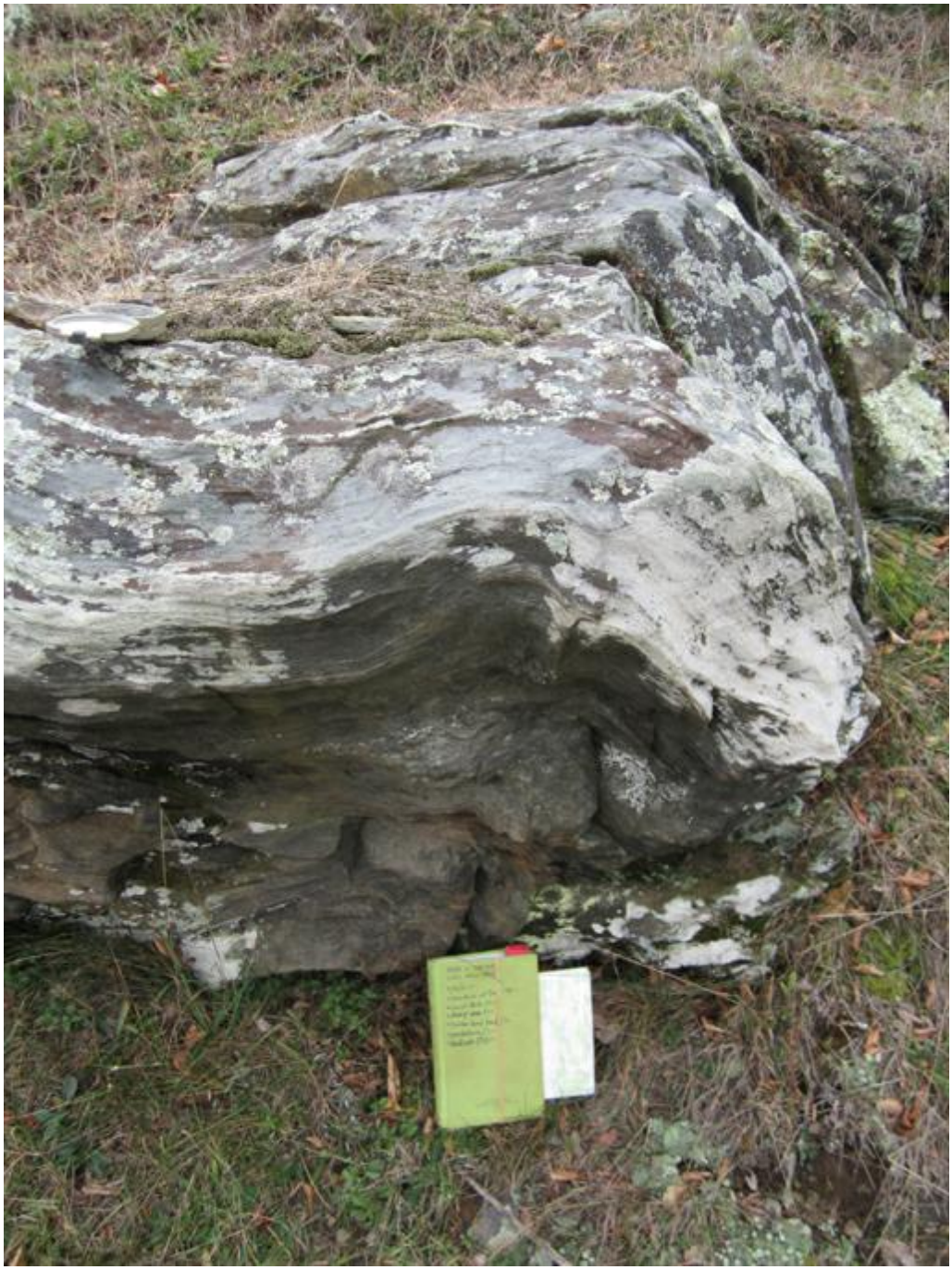
EN-187

Bedding-cleavage in graphite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

EN-191

Folds in schistose amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

EN-235



Folds on biotite amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

EN-258

Chevron folds in amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

EN-285

Fold in graphitic metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

EN-286

Fold in graphitic metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

EN-391

Porphyroblastic clinozoisite in amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

EN-408

View to northeast. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

EN-416

Granoblastic amphibole and porphyroblastic clinozoisite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

EN-424

Sheared clinozoisite amphiboliite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

EN-448

Tourmaline in biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

EN-462

Folds in biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

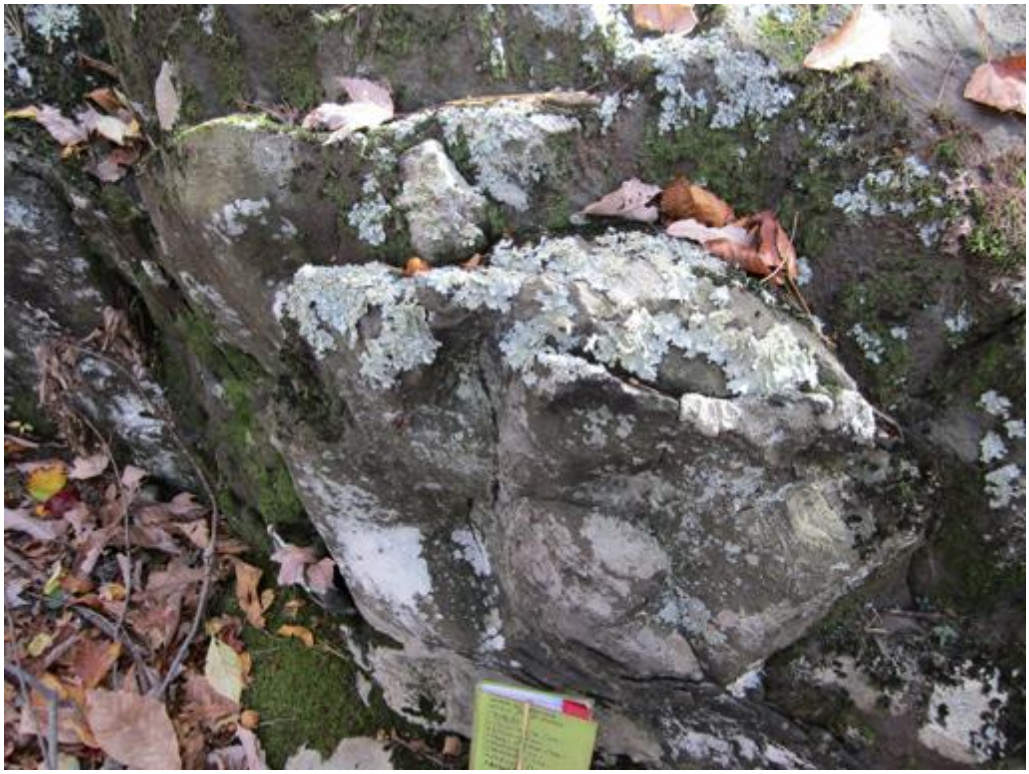
EN-467

View east into Piedmont. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FD-26

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FD-36

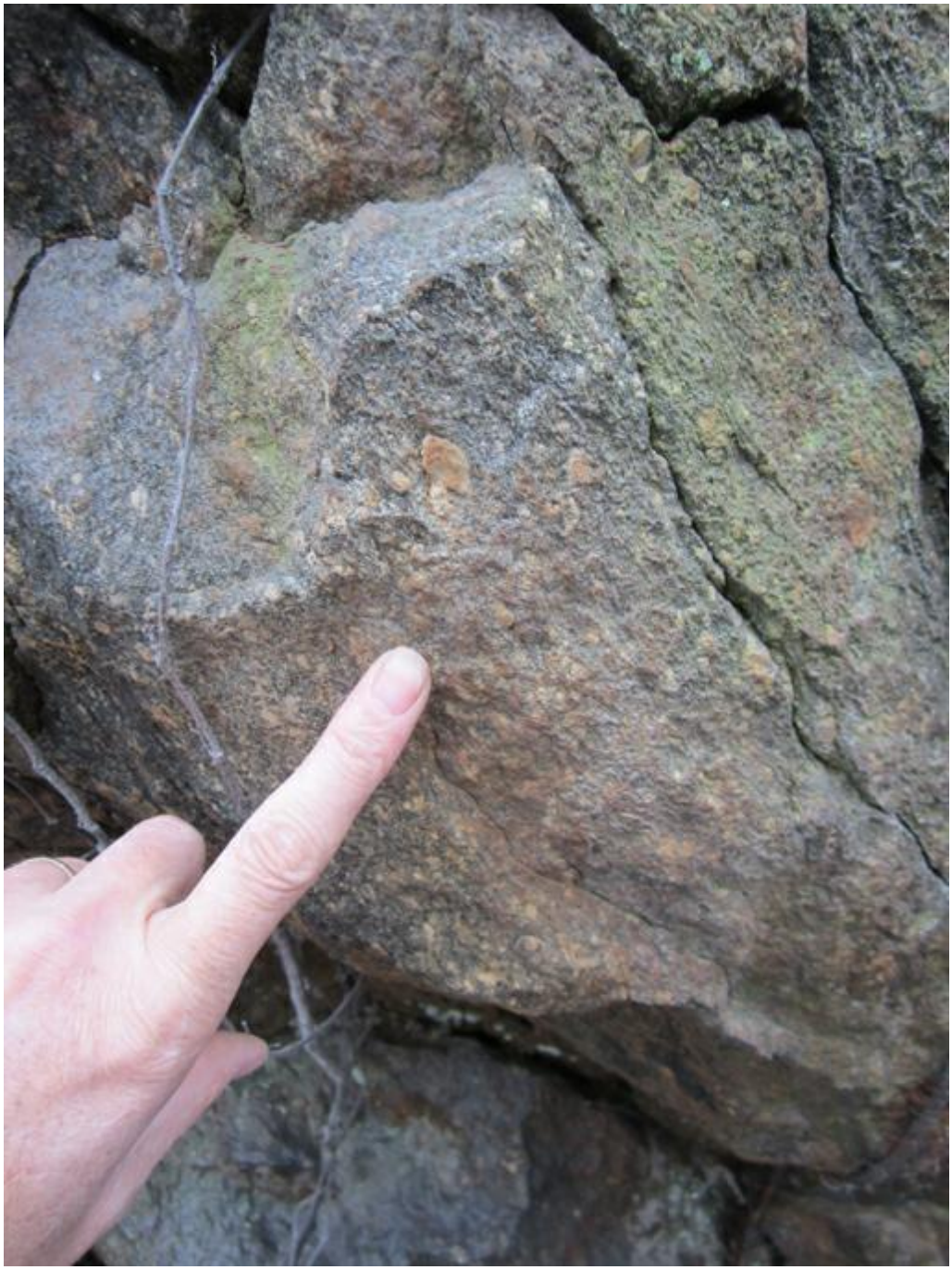


Possible columnar joints. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FD-44

Active quarry in amphibolite and graphitic metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FD-45



Amphibolitic metagraywacke with feldspar porphyroblasts. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FD-48

Compositionally layered graphitic metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FD-51

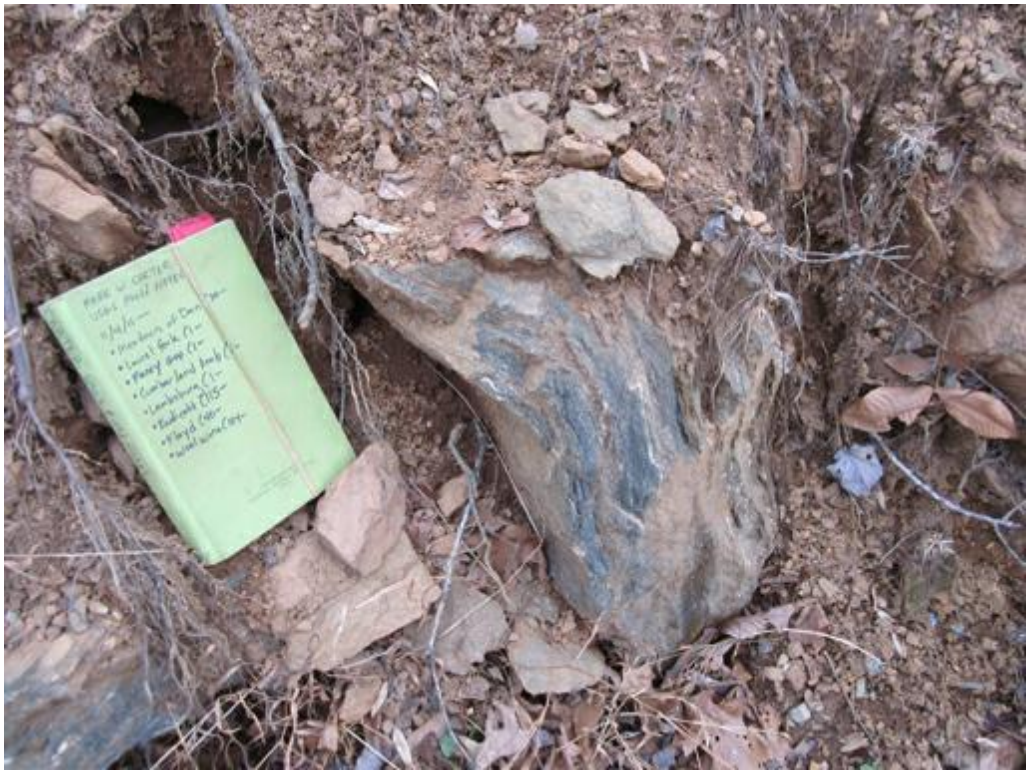
Contact between graphitic metagraywacke and amphibolite. *Extracted from:* (Blue Ridge Parkway

Bedrock North) (*GRI Source Map ID 76039).*

FD-100

F3 folds and lineation in fissile amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FD-132



Folded amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FD-134

Folded muscovite-quartz schist. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-16

Garnet-mica schist. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-18

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-21

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-25

Folds cut by S2 foliation. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-32

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-45

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-47

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-49

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-51

Cross-cutting quartz vein. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-52

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-54

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

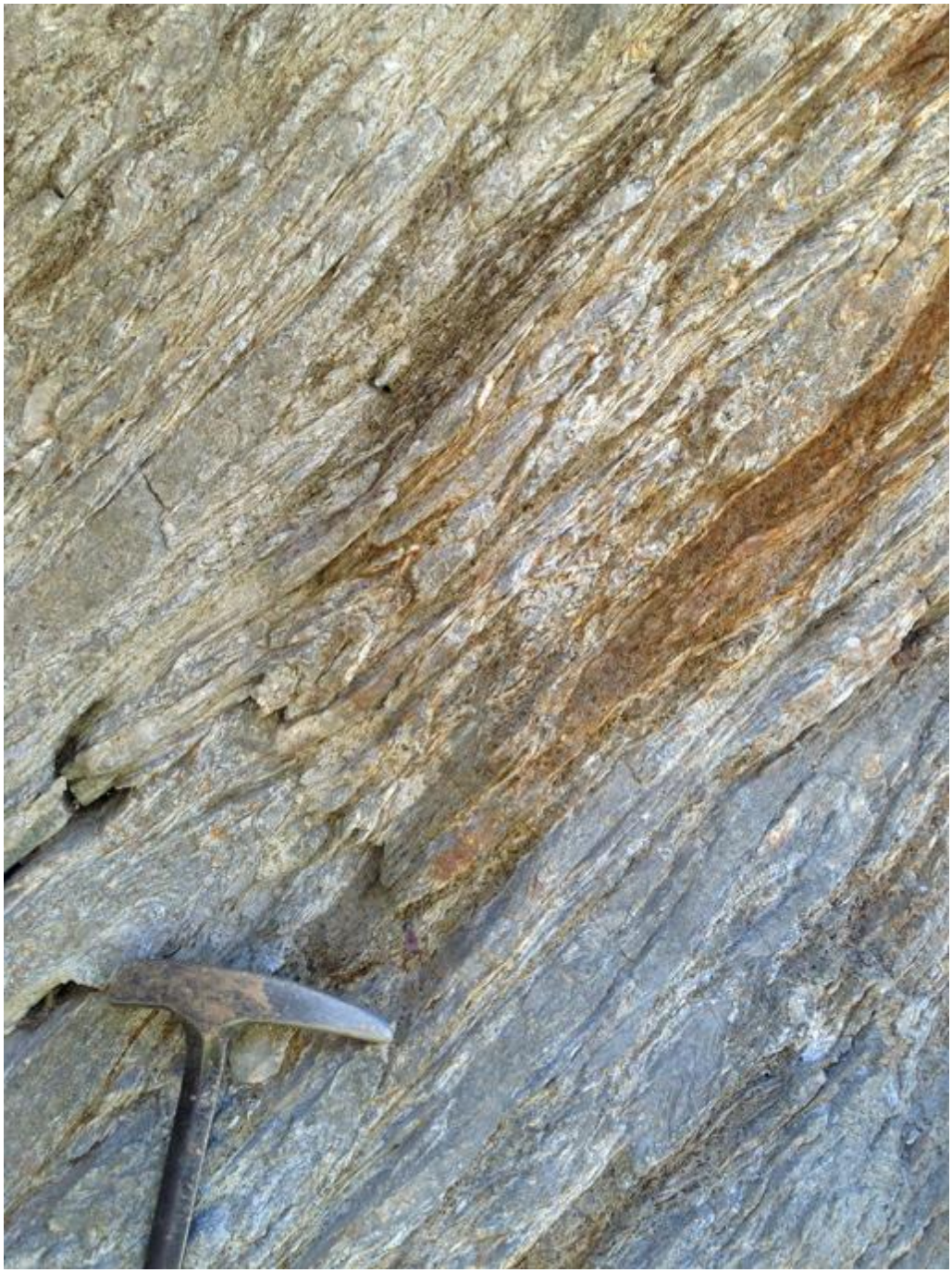
FG-92

F1 isoclinal folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-96

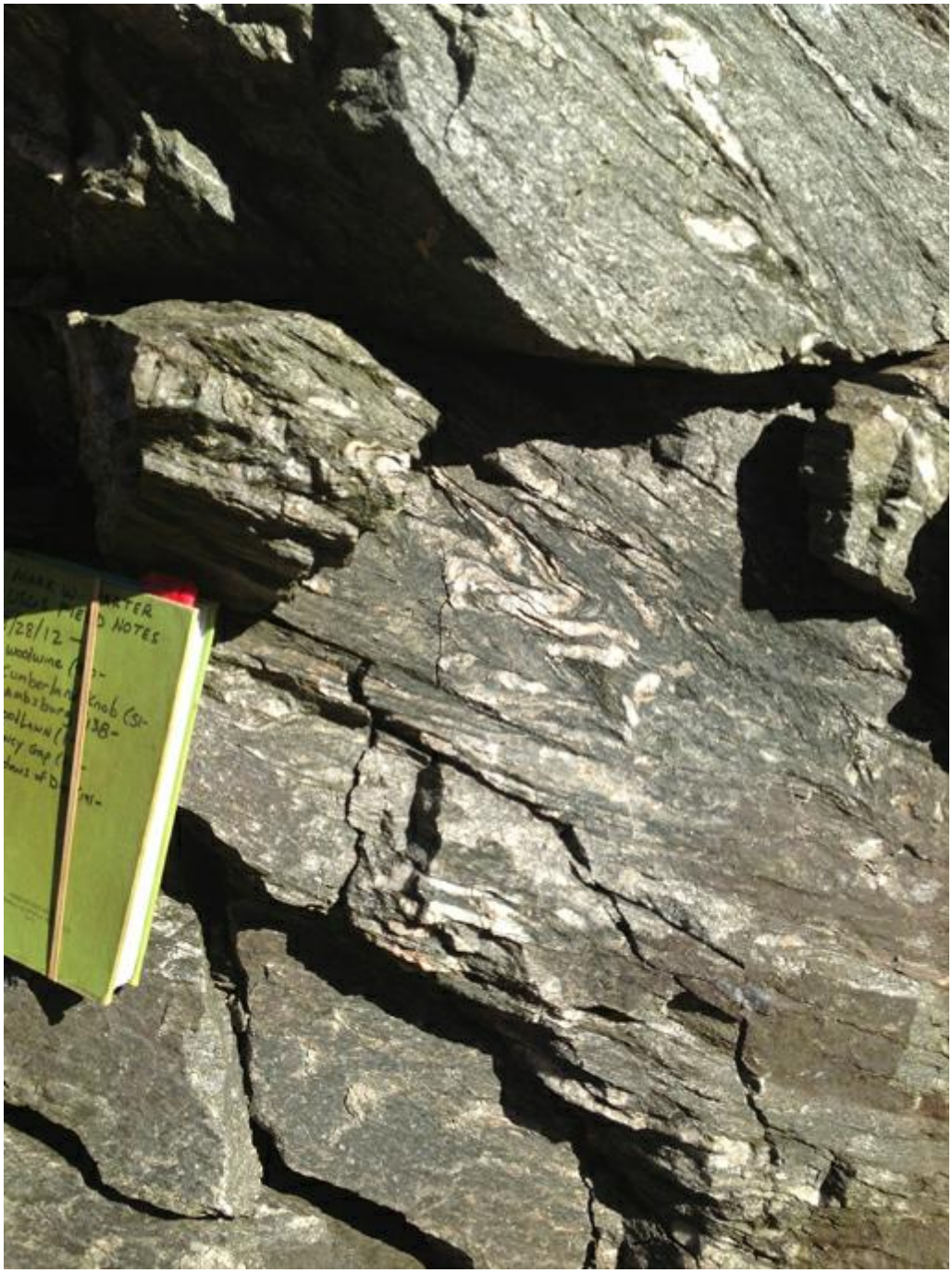
F1 isoclinal folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-219



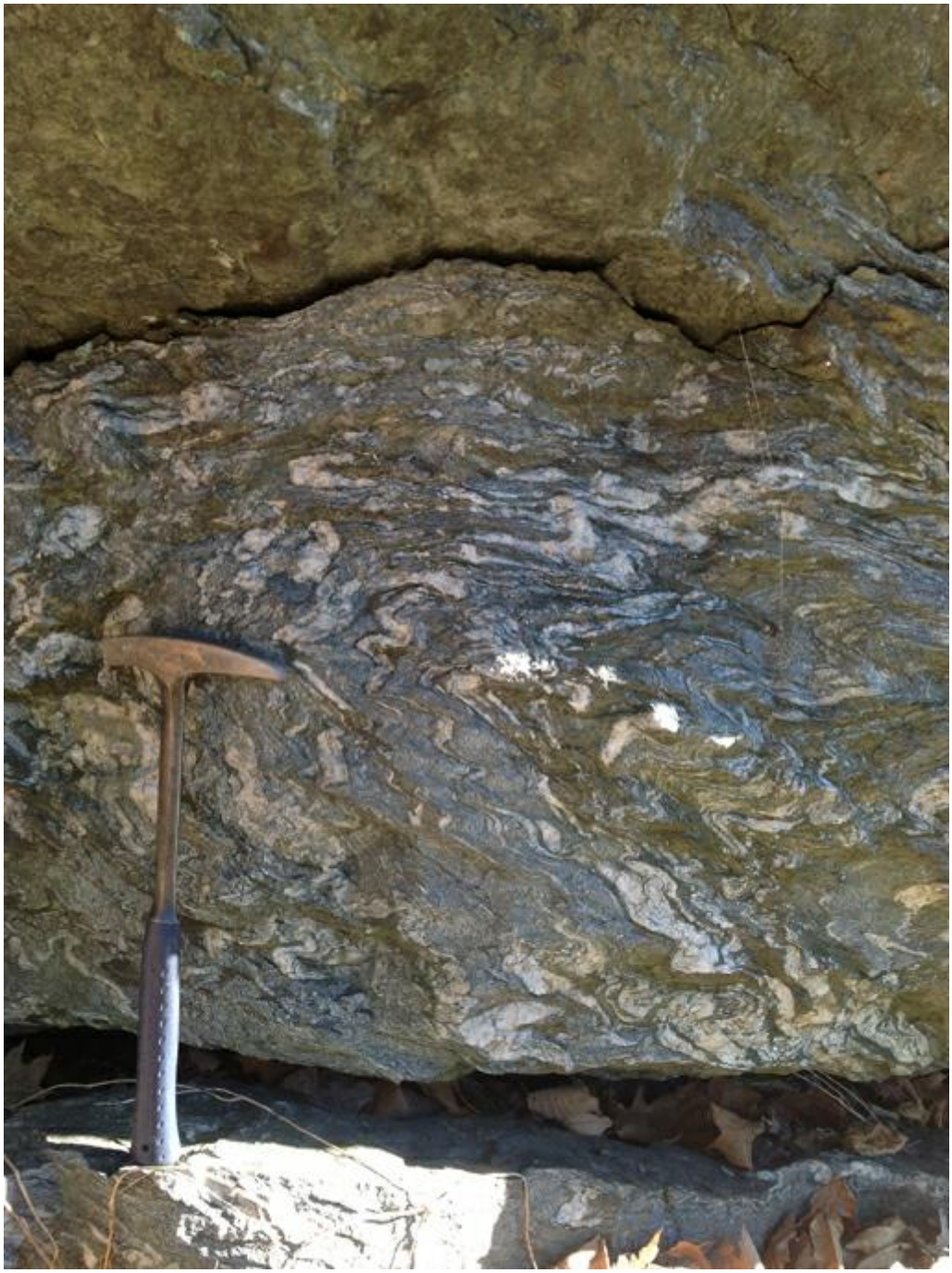
Folds in garnetiferous biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-237



Folds in biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-238



Folds in biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-242

Ductile fault cutting biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-245

Folds in biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-247

Folds in biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-257

Layered quartzite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-303

Folds in garnetiferous biotite-muscovite pin-striped gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-351

Folds in pin-striped biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-478

Folds in pin-striped gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

FG-483

S1 and S2 in biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

HD-7

Mylonite with lineation. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

HD-8

Mylonite with lineation. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

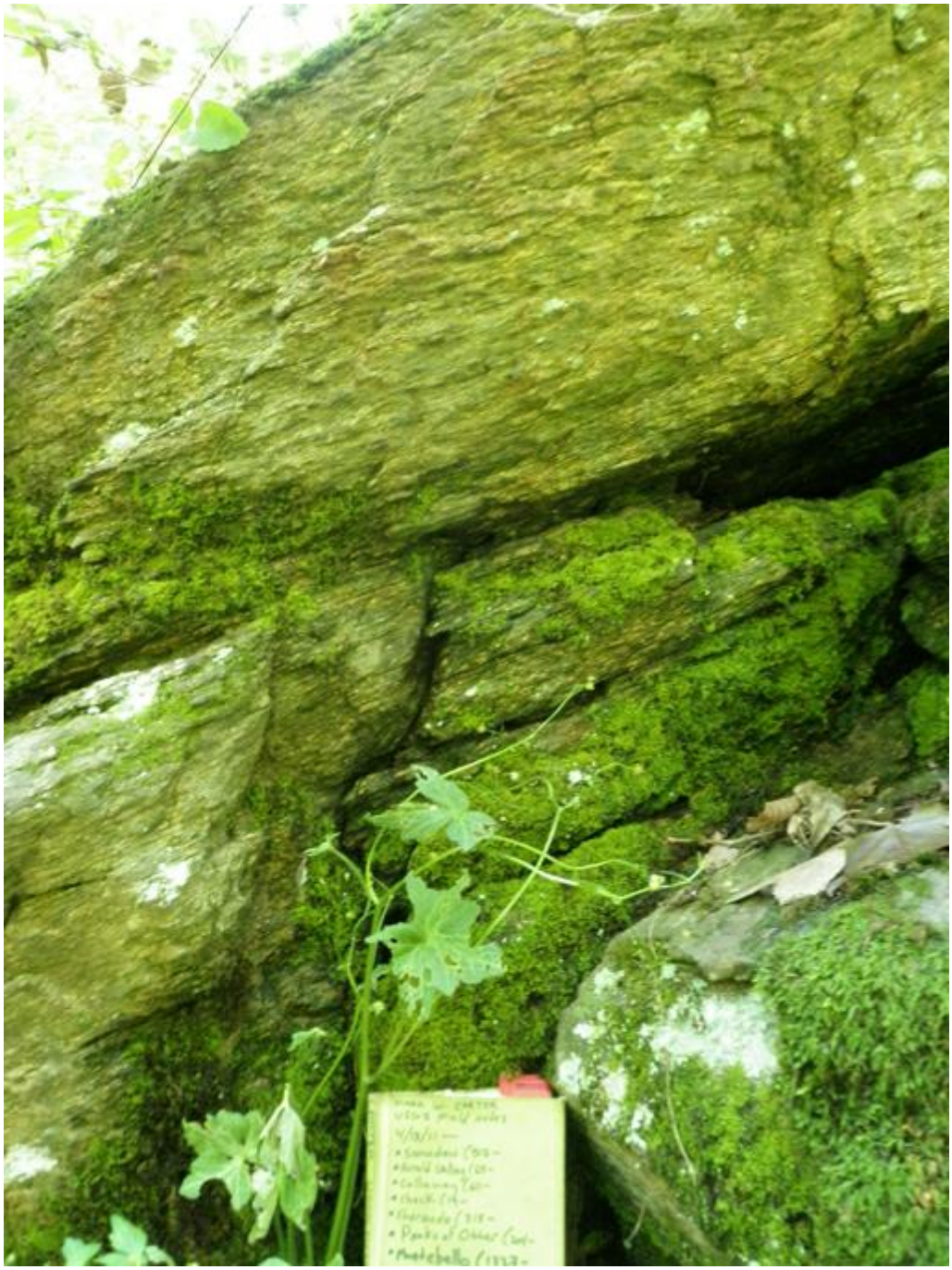
HD-10

L-tectonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

HD-12

L-tectonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

HD-14



Granitic mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

HD-18

Basement clast within basal metasiltstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

LB-54

Stratified high-level alluvium. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

LB-91

Isoclinal F1 fold axes. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

LB-92

Sams Knob. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

LB-121

Foliation in metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

LB-125

F2 fold hinge. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

LB-194

Schistose gneiss with folded quartz stringers. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

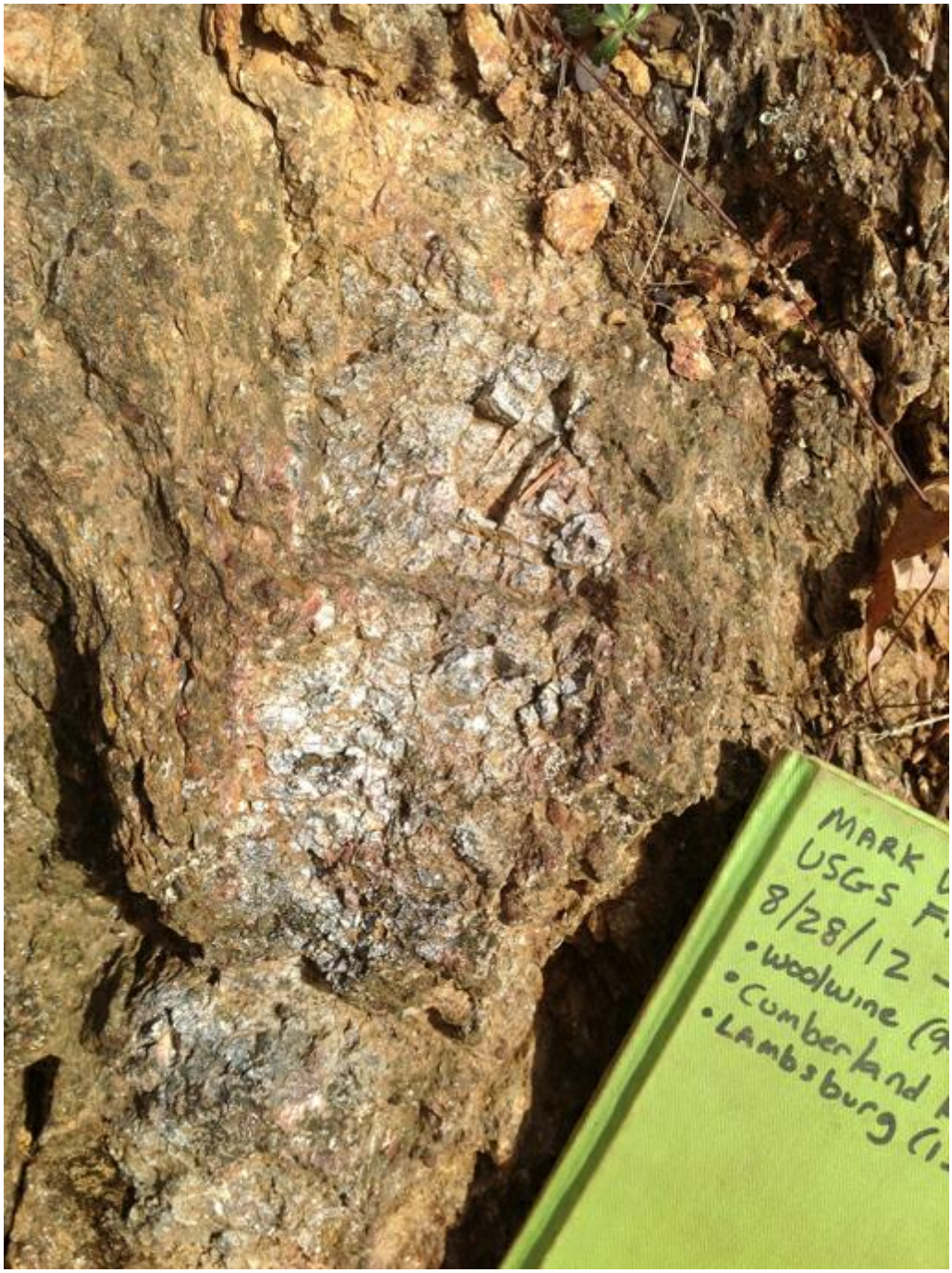
LB-218

View from Horse Knob. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

LB-226

View from Fisher Peak. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

LB-405

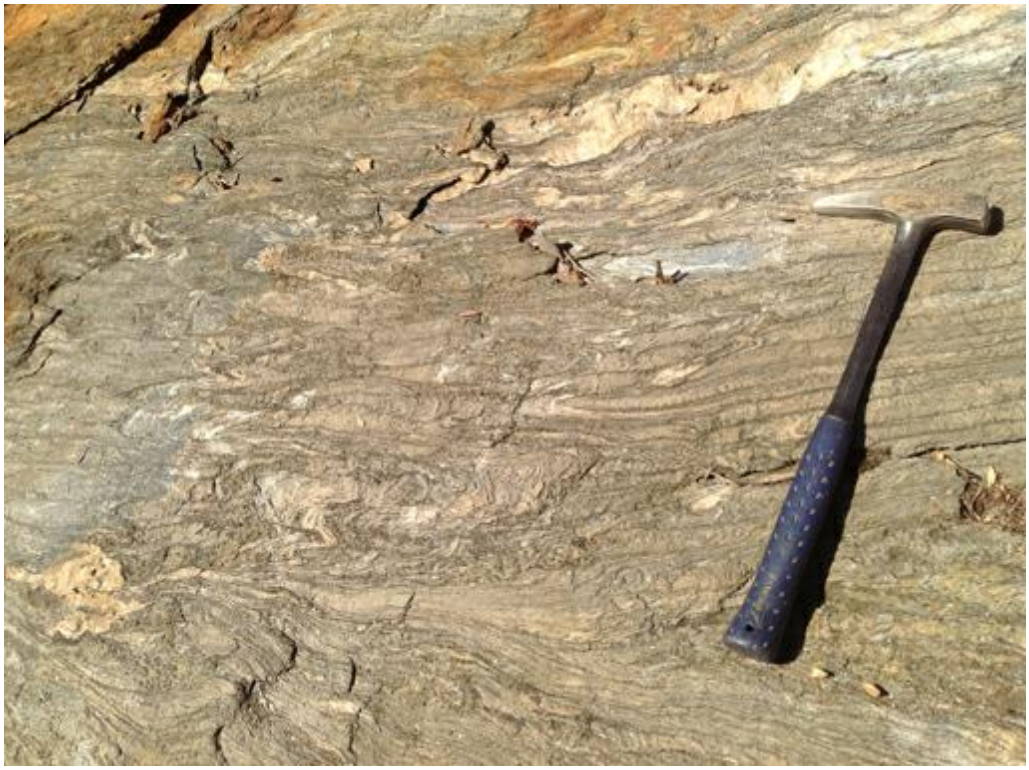


Cross-cutting pegmatite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

LB-425

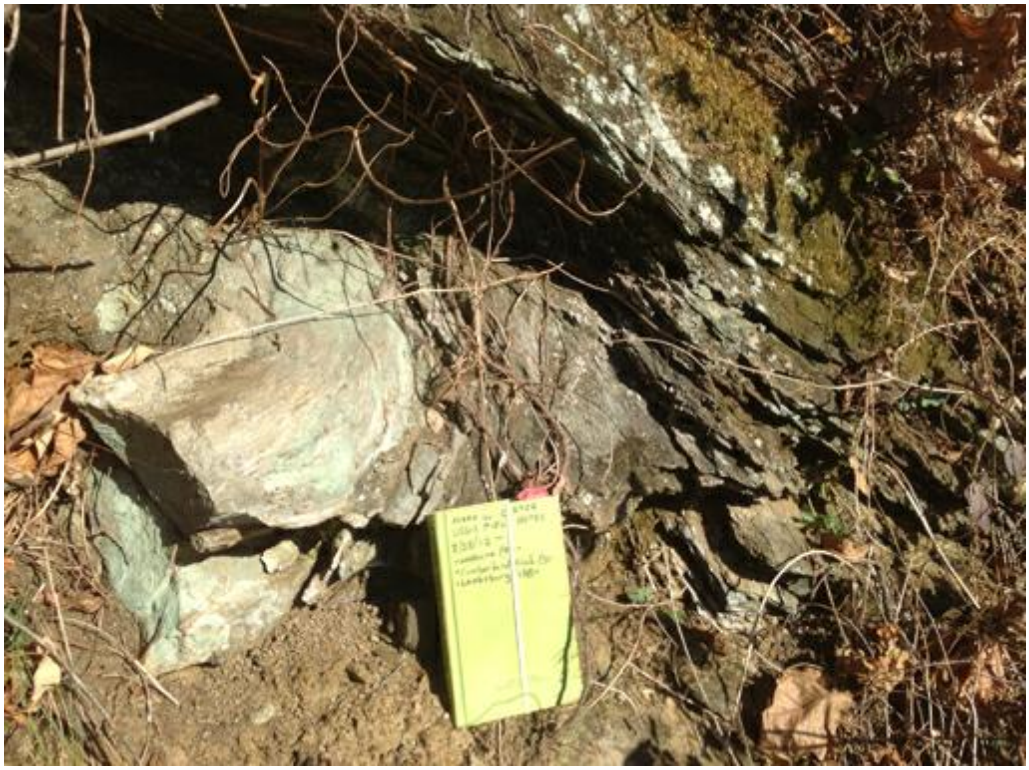
Pin-striped F2 folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

LB-434



Pin-striped gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

LB-437

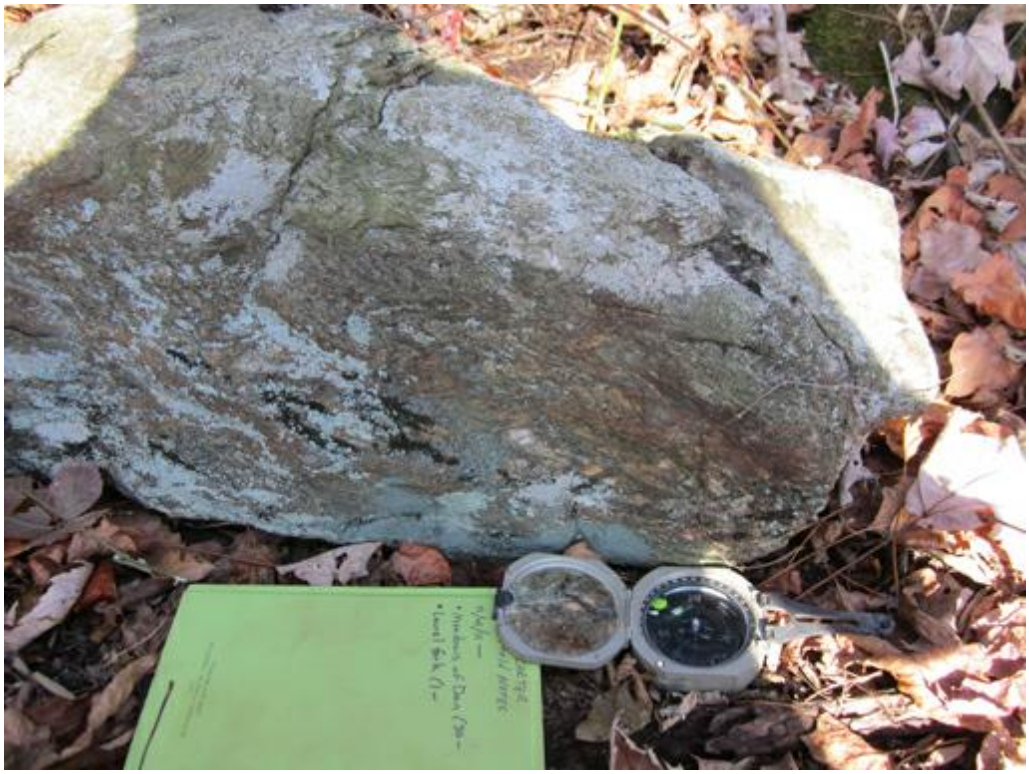


Block of pin-striped in schist. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

LF-8

Isoclines in metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

LF-18



Folds in metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

LF-37

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

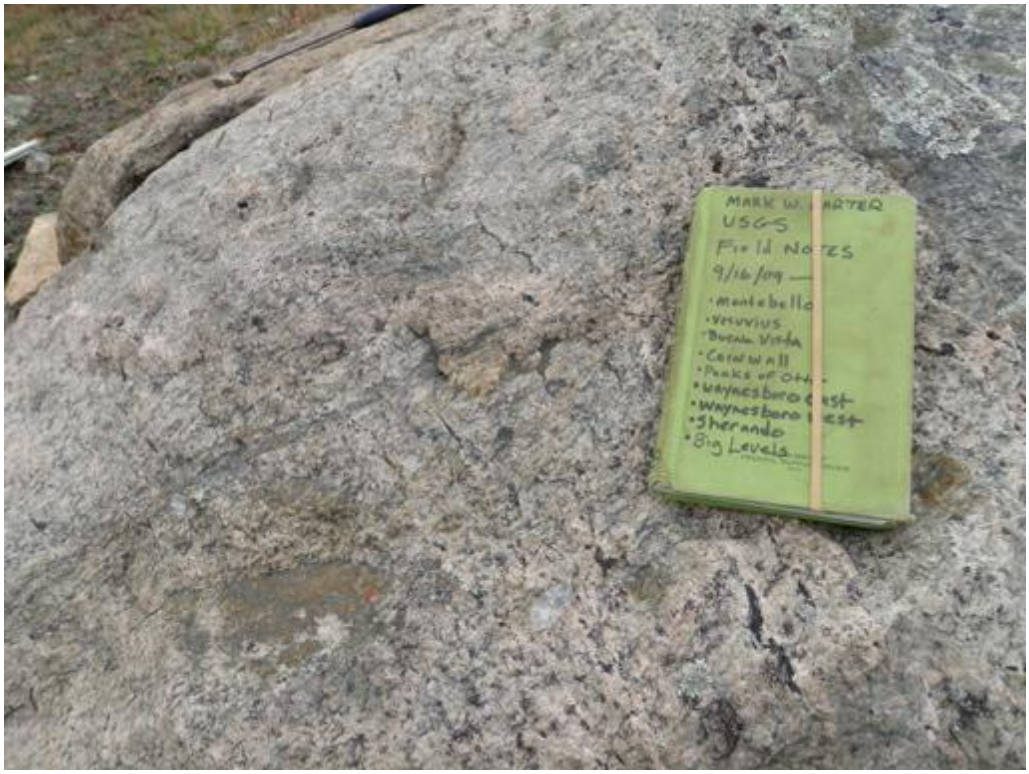
LF-67

View of Buffalo Mountain. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

LF-154

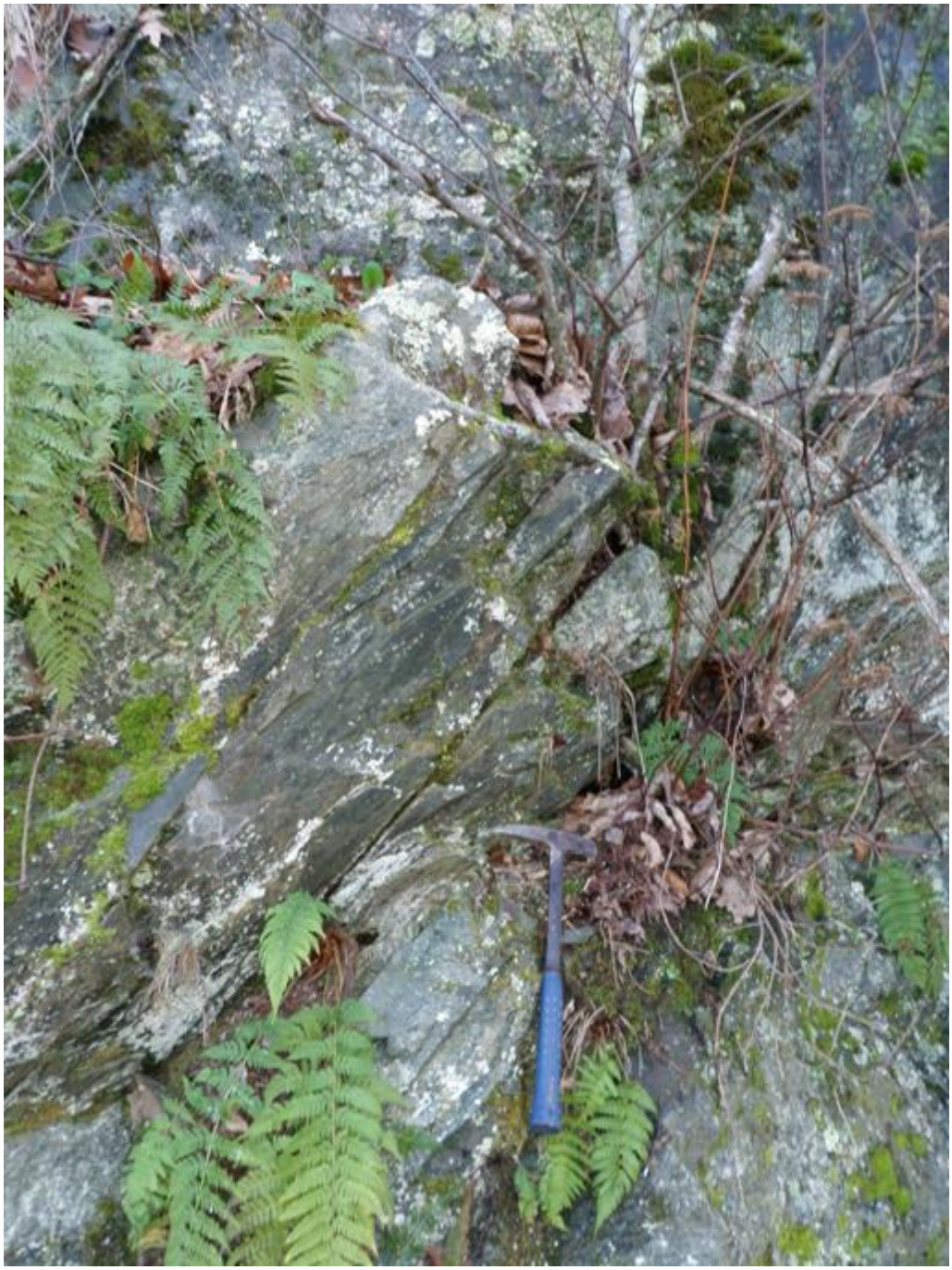
Isoclinal folds in biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-88



S2 gash cleavage. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-91



Foliation in greenstone dike. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-95

Foliation in megaporphyroclastic leucogranitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-120

Mylonitic foliation in megaporphyroclastic leucogranitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

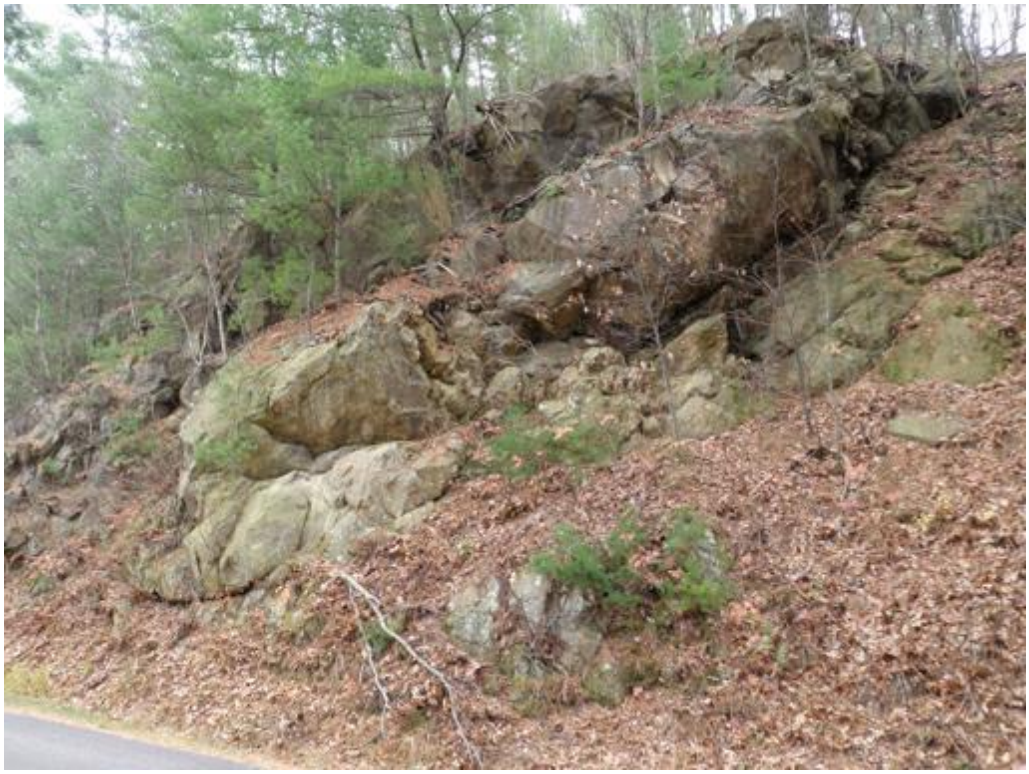
MB-121

Foliation in megaporphyroclastic leucogranitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-134

Cross-cutting greenstone dike. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-138



Greenstone intrusion. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-142

Granite intrusion. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-166

Granulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-169

Coarse-layered megacrystic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-182

Leucogranulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-236

Megacrystic charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-247

Folds in quartz-feld leucogranitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-263

Nettle Creek-like granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-305

Paleozoic foliation in leucocharnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

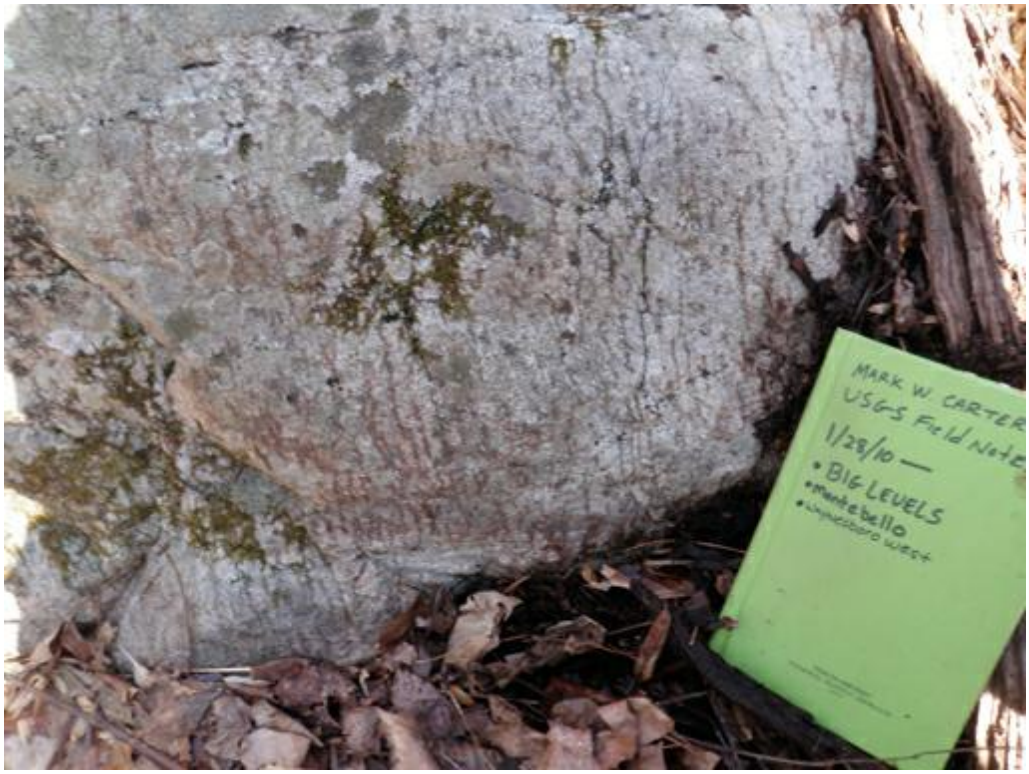
MB-329

Leucogranitoid enclosed by charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-336

Porphyroclastic granulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-338



Coarse-layered leucogranulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-345

Megacrystic charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-346

Megacrystic charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-380

Megacrystic leucocharnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-393

Xenolith within leucogranitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-398

Xenolith within leucogranitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-399

Megacrystic charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-424

Coarse granulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-457

Megacrystic charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-465

Colluvial shoot. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

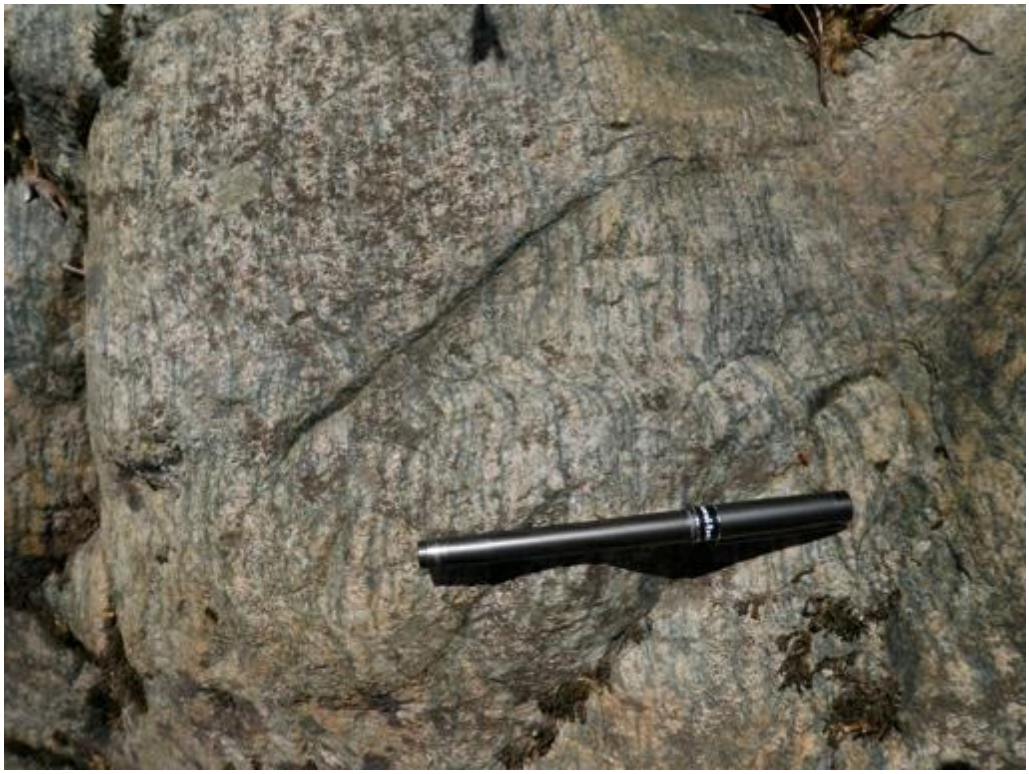
MB-468

Megacrystic leucogranitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-478

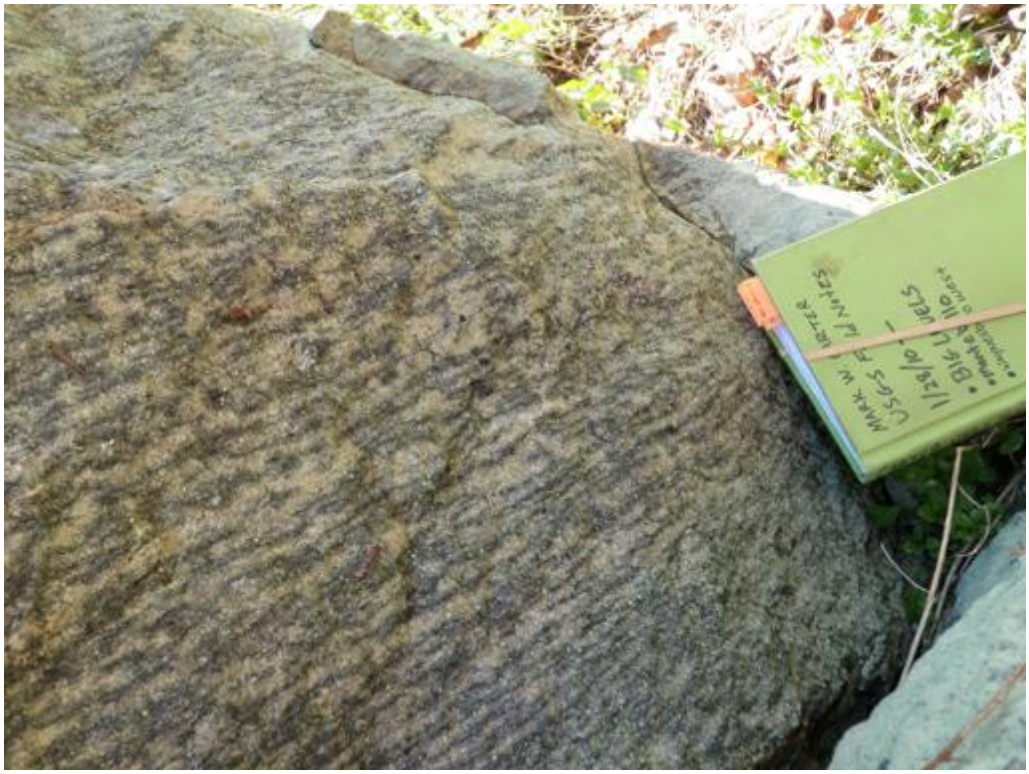
Old layering in megacrystic charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-505



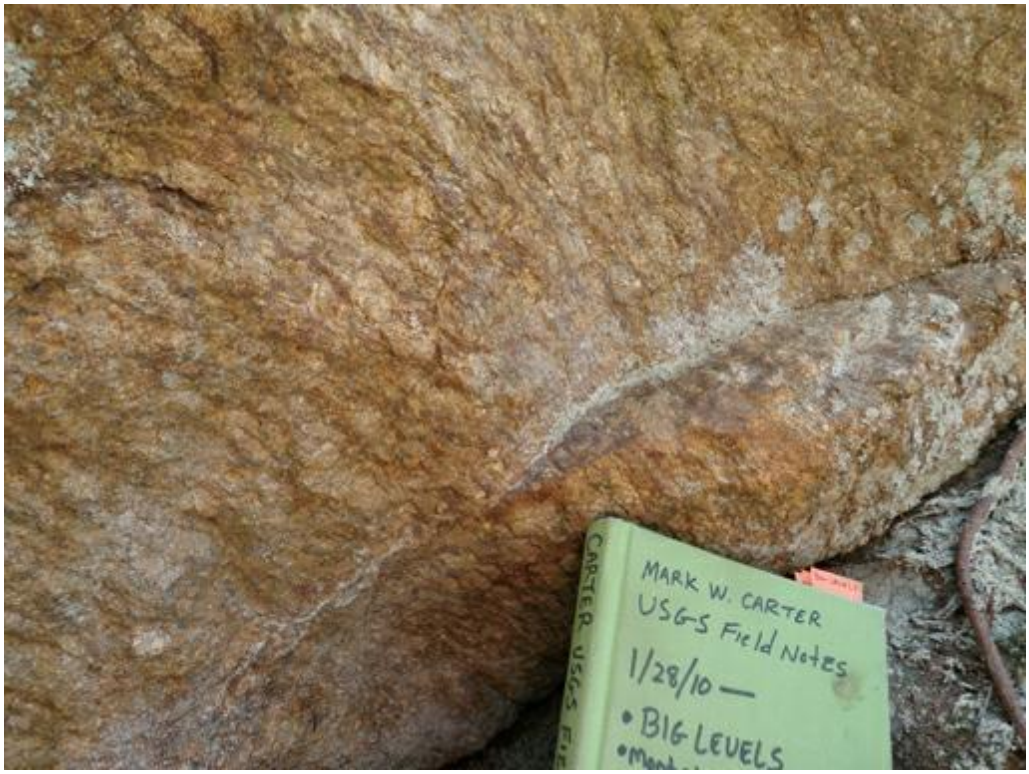
Folds in granulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-512



Layering in granulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-515

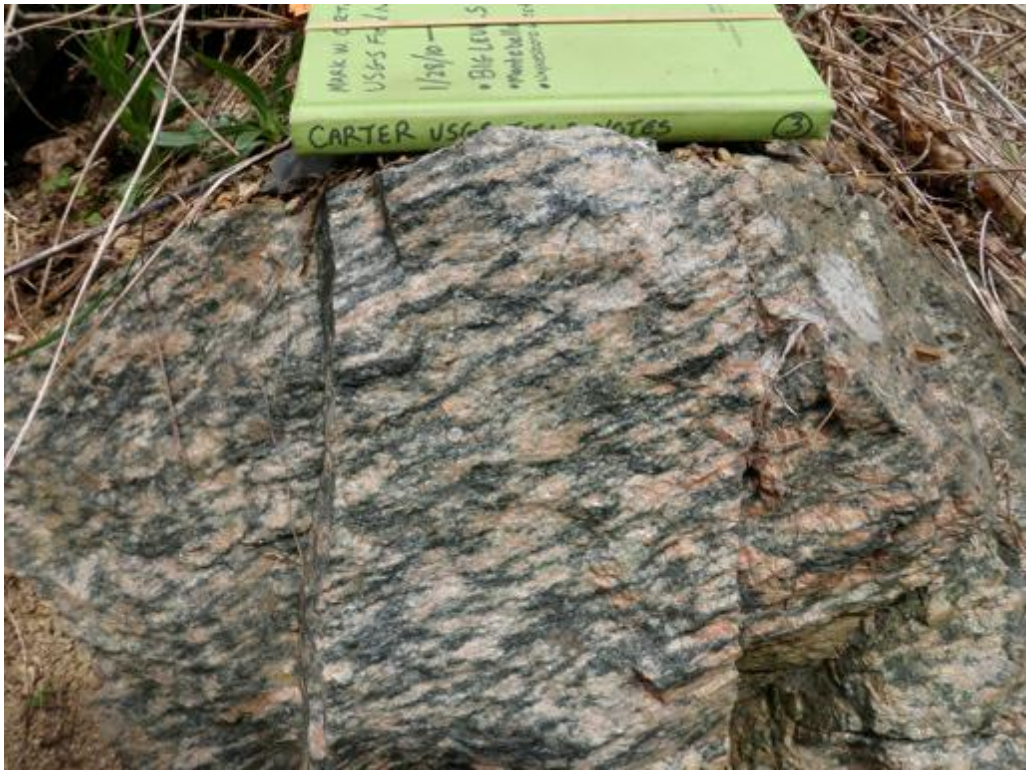


Megacrysts in granulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-519

Spotty leucogranulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-524

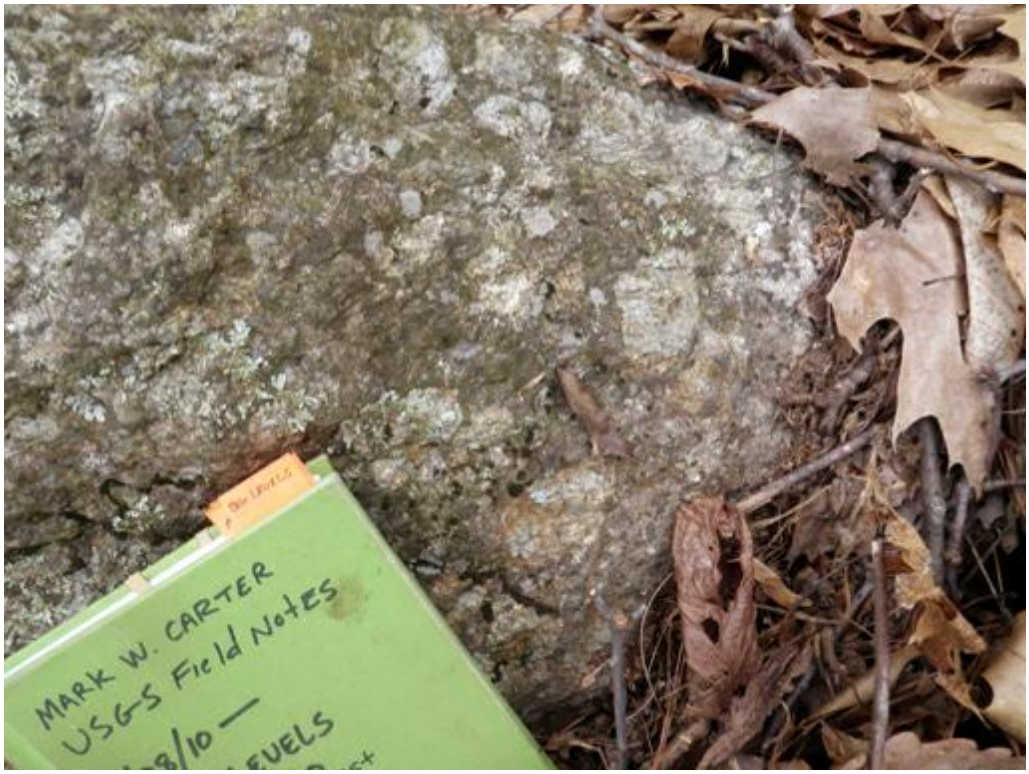


Megacrystic granulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-569

Megacrysts. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-575



Megacrysts. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-616

Foliation in quartz-feldspar leucogranitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-633

Porphyritic Mesozoic dike in granulite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-663

Mica in purple siltstone and conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

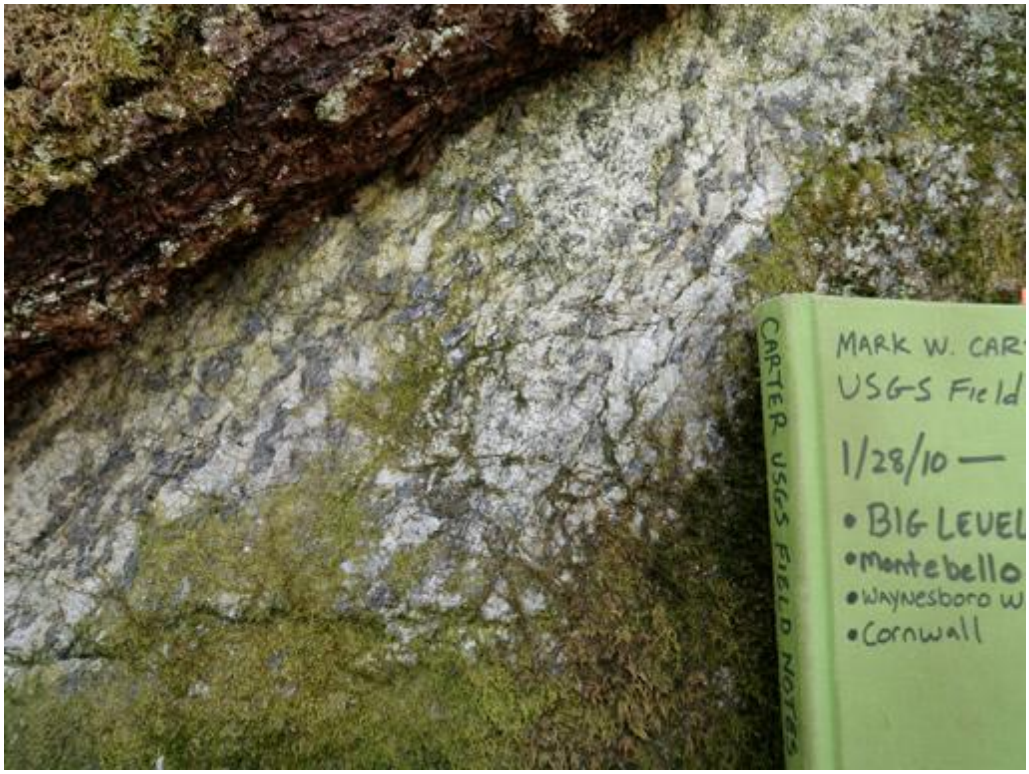
MB-668

Megacrystic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-670

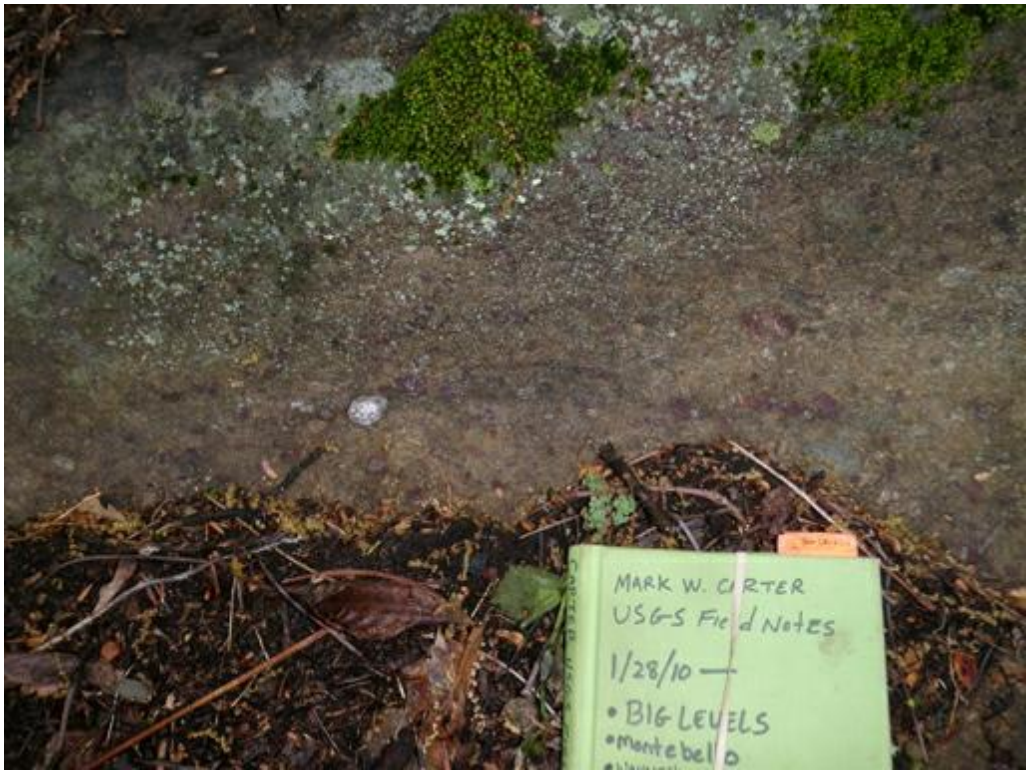
Megacrystic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-682



Foliation in quartz-feldspar leucogranitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-700



Boulder conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-709

Cross-beds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

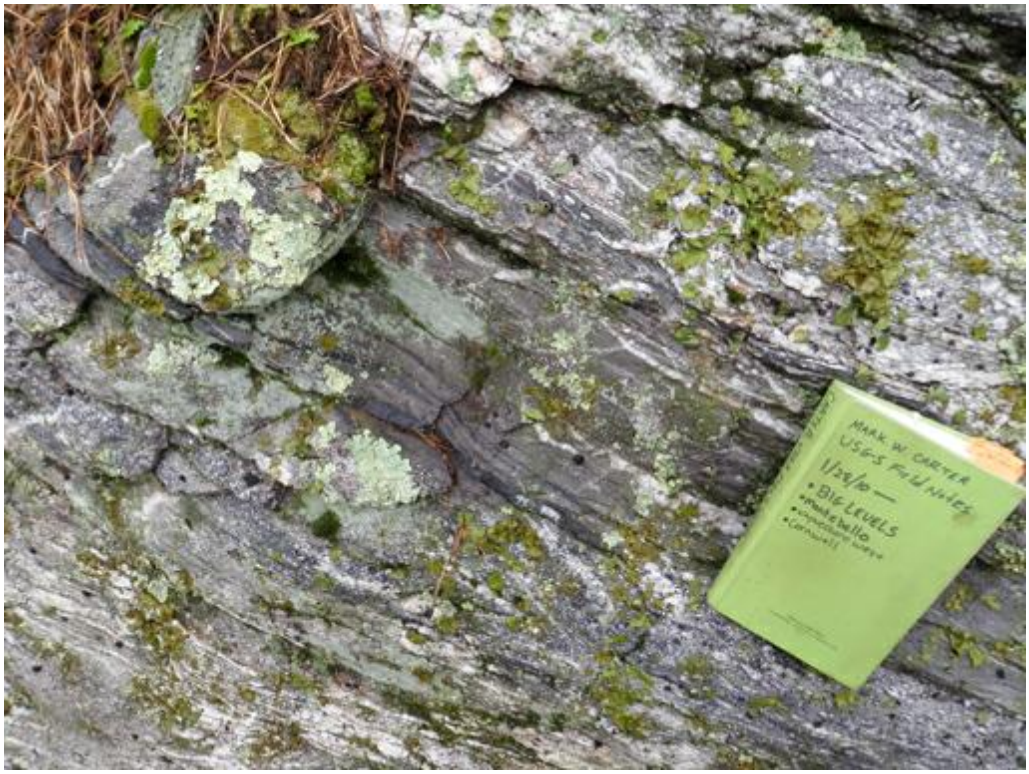
MB-710

Graded bedding. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-714

Purple banded sandstone and conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-719

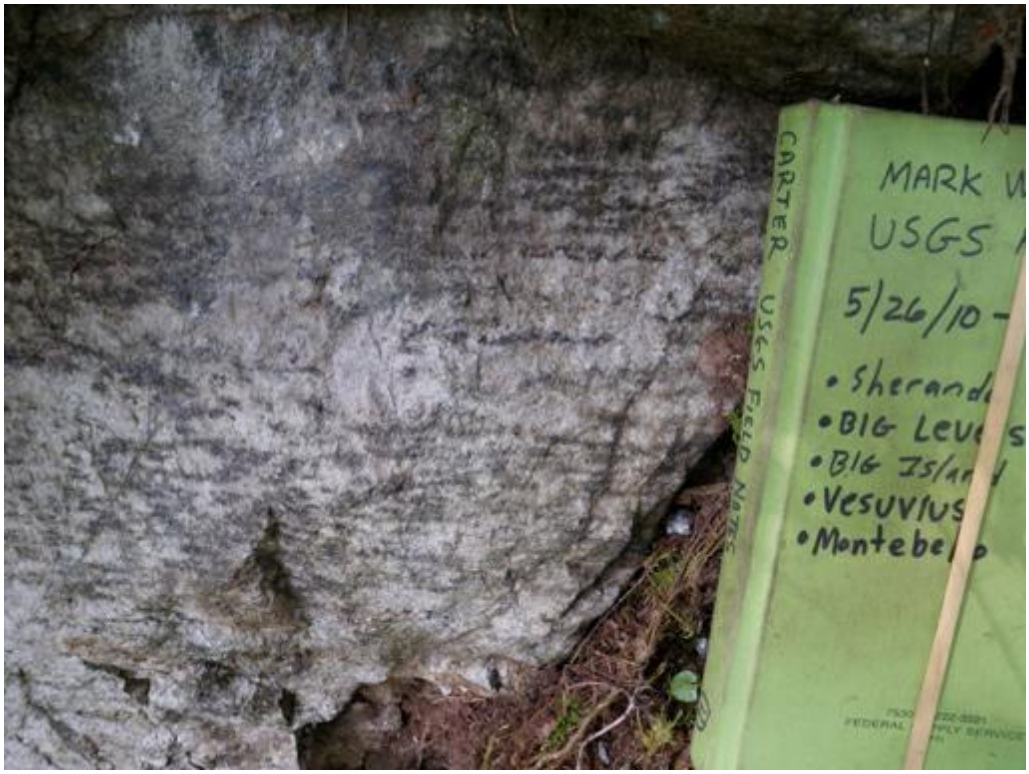


Cross-bedded conglomeratic quartzite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-750

Mylonitic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-764

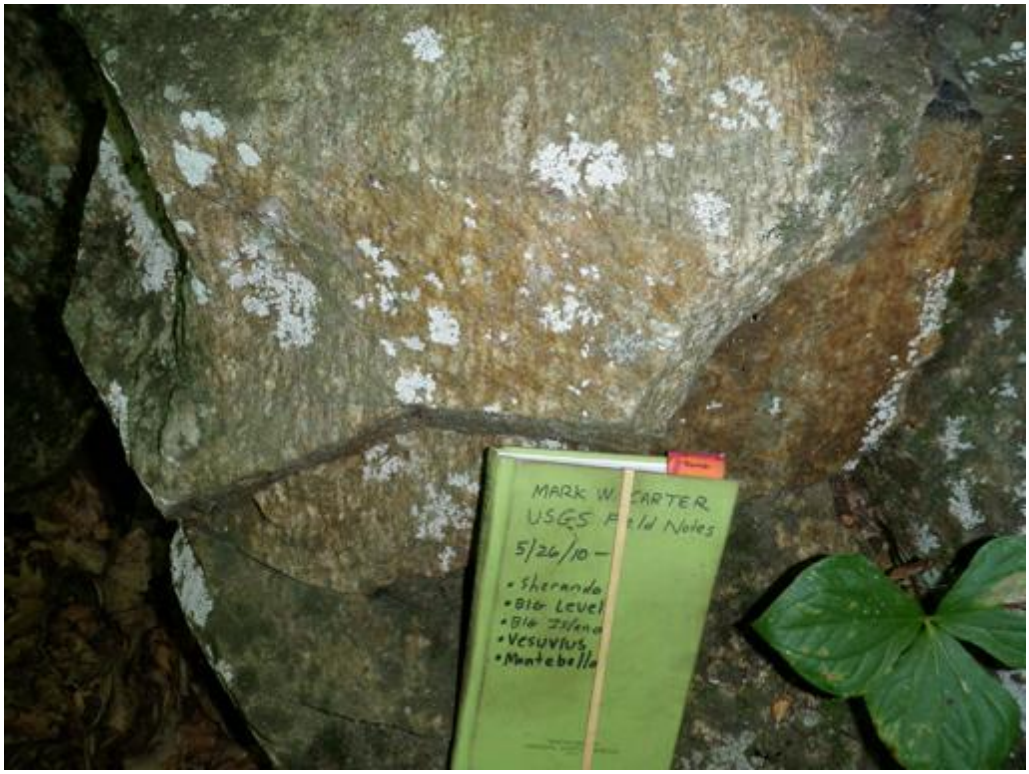


Statons Creek gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-765

Staton Creek Falls. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-778



Foliation in Statons Creek gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-802

Skolithos-bearing quartzite clast. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

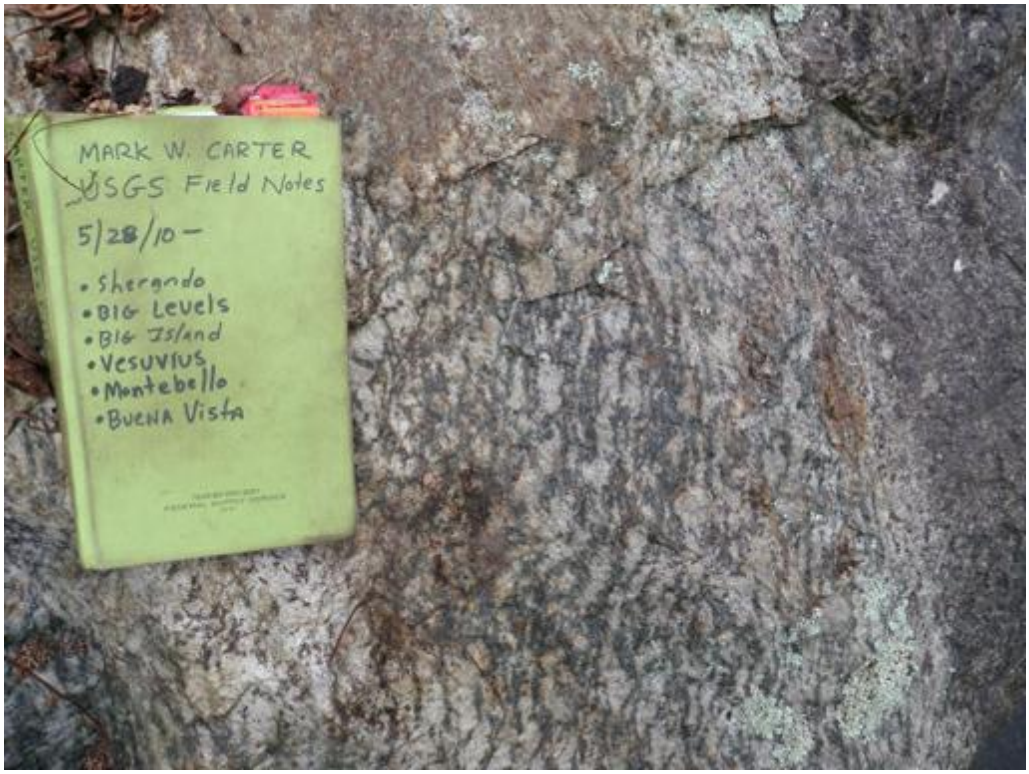
MB-804

Shear bands in megacrystic charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-815

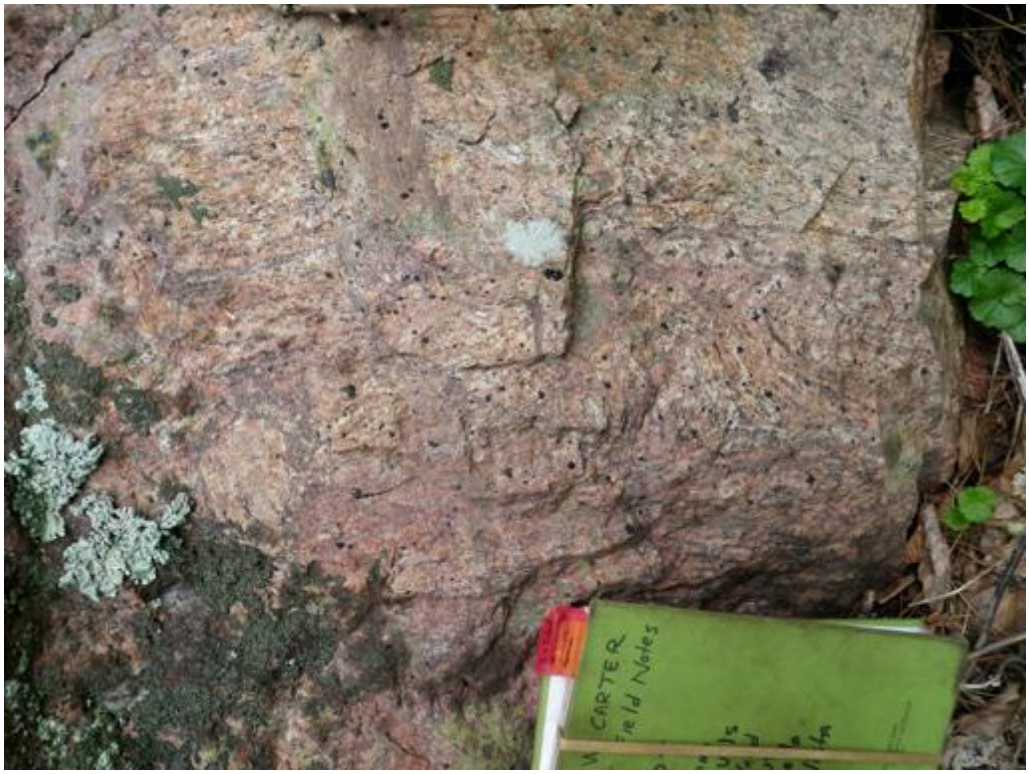
Statons Creek-type gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-816



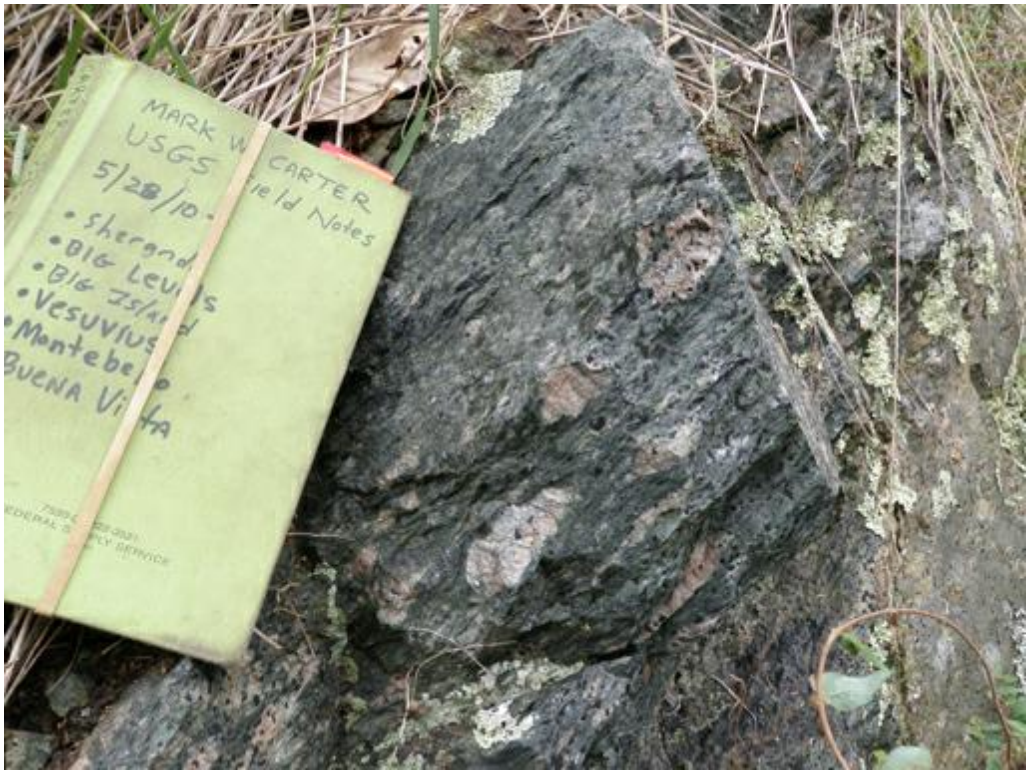
Irish Creek-type gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-822



Breccia in Statons Creek-type gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-824



Megacrystic mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-857

Graded bedding. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-877

Megaporphyroclastic meta-quartz monzonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-891

Statons Creek gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-894

Statons Creek gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-896

Irish Creek-like Statons Creek gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-915

Purple rhythmites. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-916

Purple rhythmites near basement contact. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-917

Slickenlines on bedding surface at basement contact. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-926

Spotty gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-929

Mylonite within schistose sandstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-947

Upper Unicoi quartzite cliff. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-948

Low-angle fault surface with slicks. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

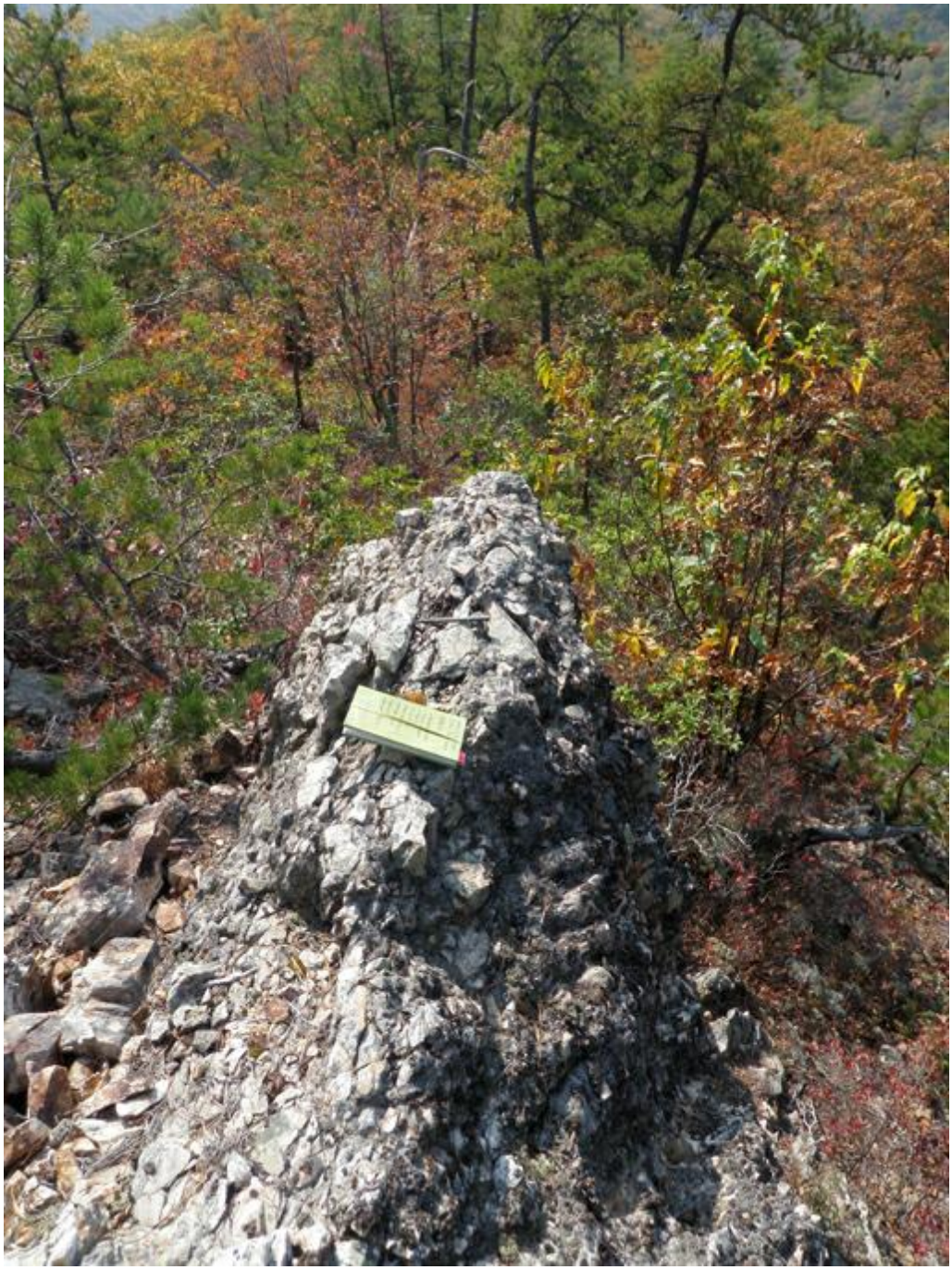
MB-951

Bearwallow. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-957

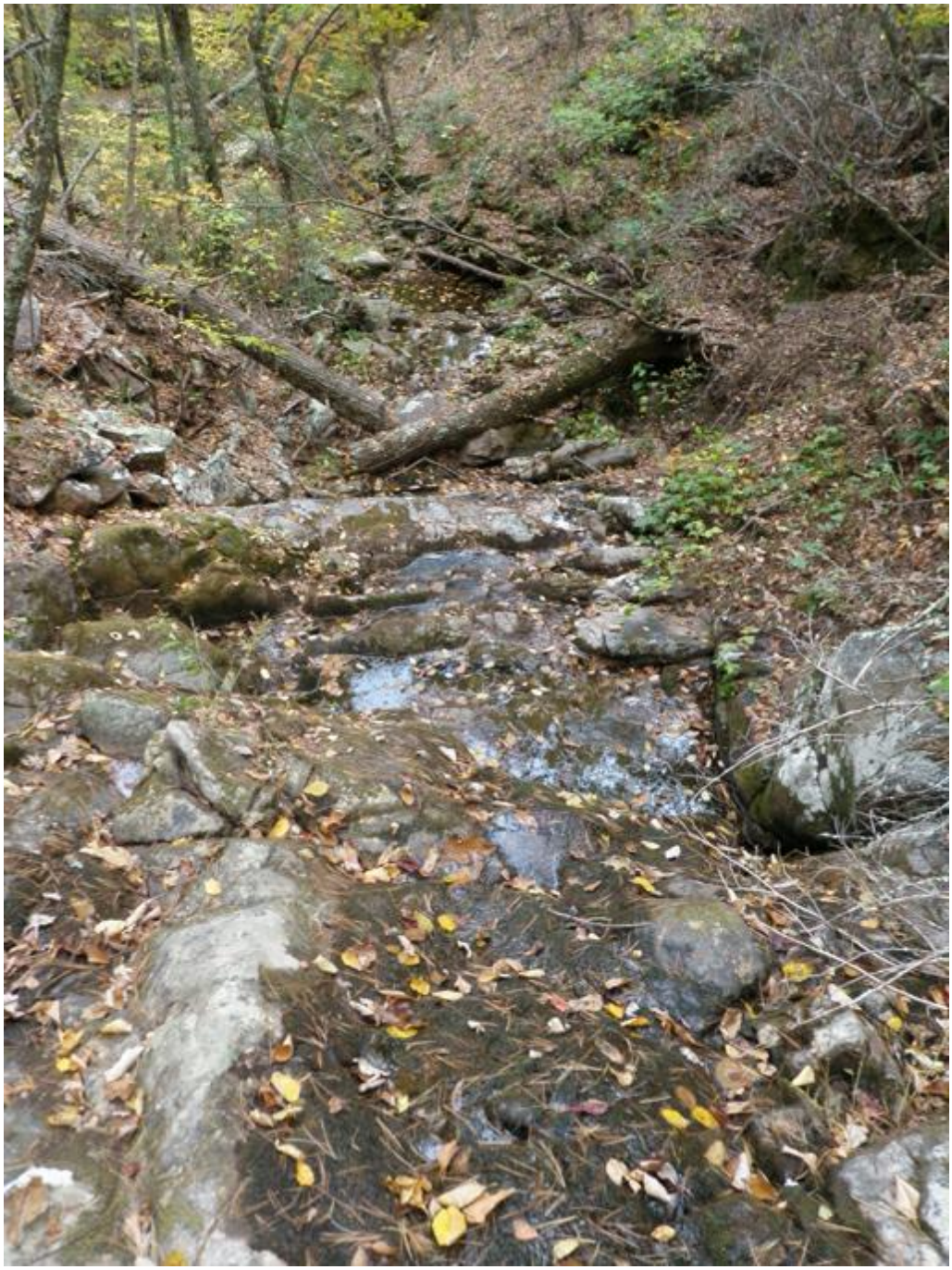
Fold in fine-grained sandstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-969



Breccia zone in quartzite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-995



Waterfall on upper Unicoi quartzite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-997

Purple mudstone and graywacke conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-1217

Conglomerate with basement clasts. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

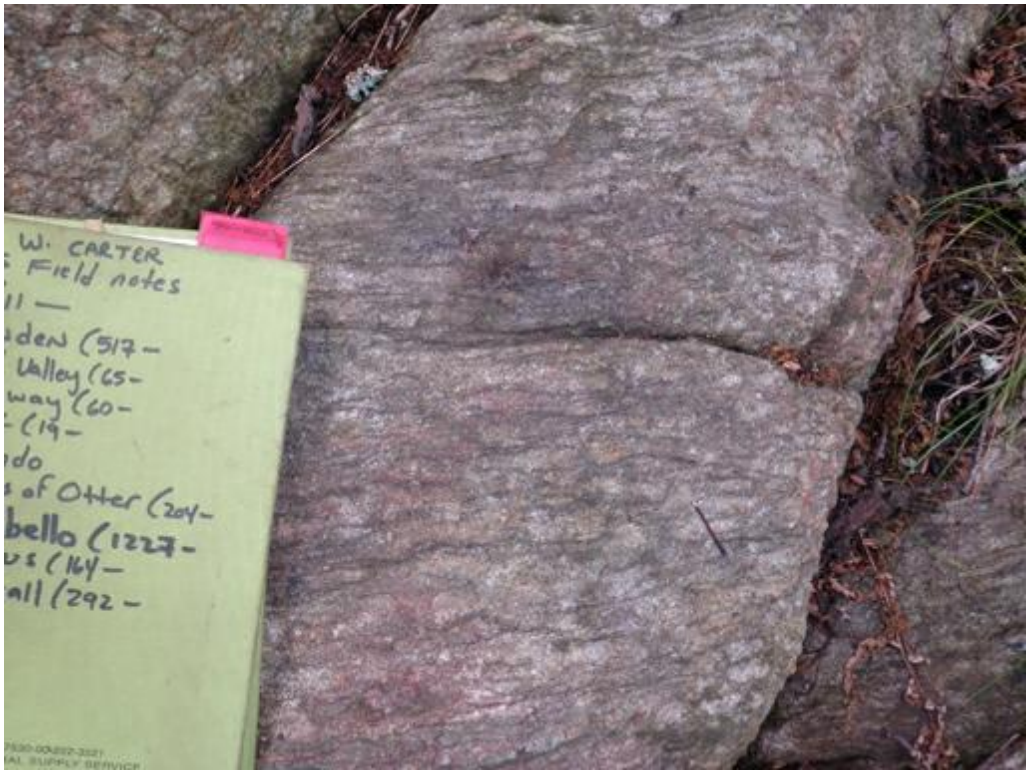
MB-1223

Stratigraphic section. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-1246

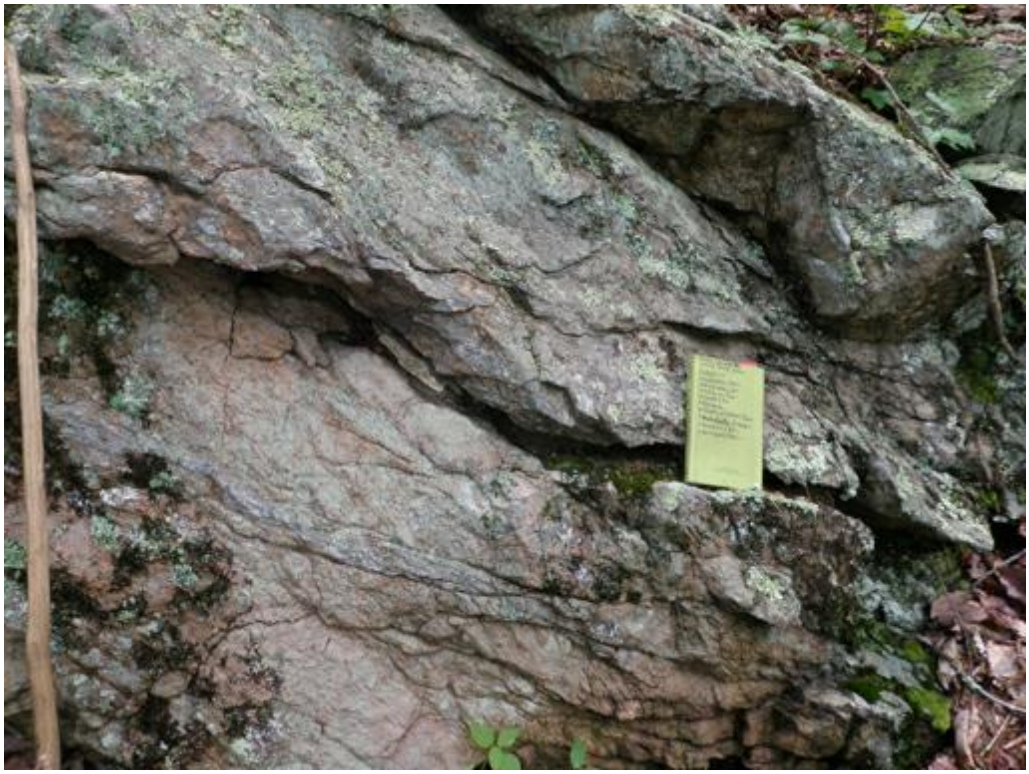
Cross-beds in quartzite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-1437



Statons Creek gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MB-1440

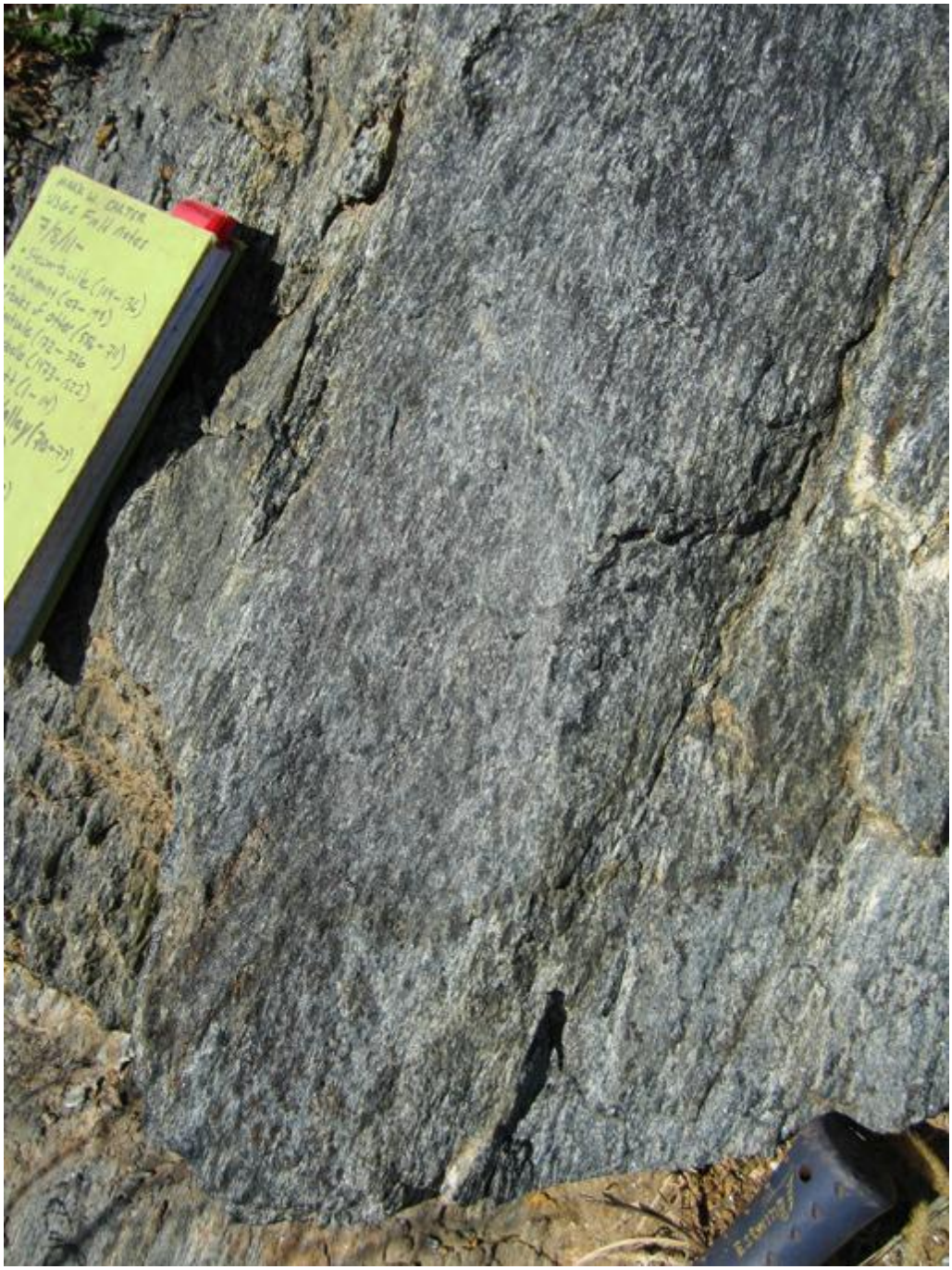


Statons Creek gneiss cut by leucogranitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MD-11

Lineation in biotite amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MD-12



Lineation in biotite amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MD-15

Layering and folds in biotite amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MD-59

Quarry. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MD-60

Comp layering-folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MD-101

Tighly folded metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MD-118

Biotite schist and gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MD-119

Banded amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MD-120

Lineated biotite-hornblende amphibolite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

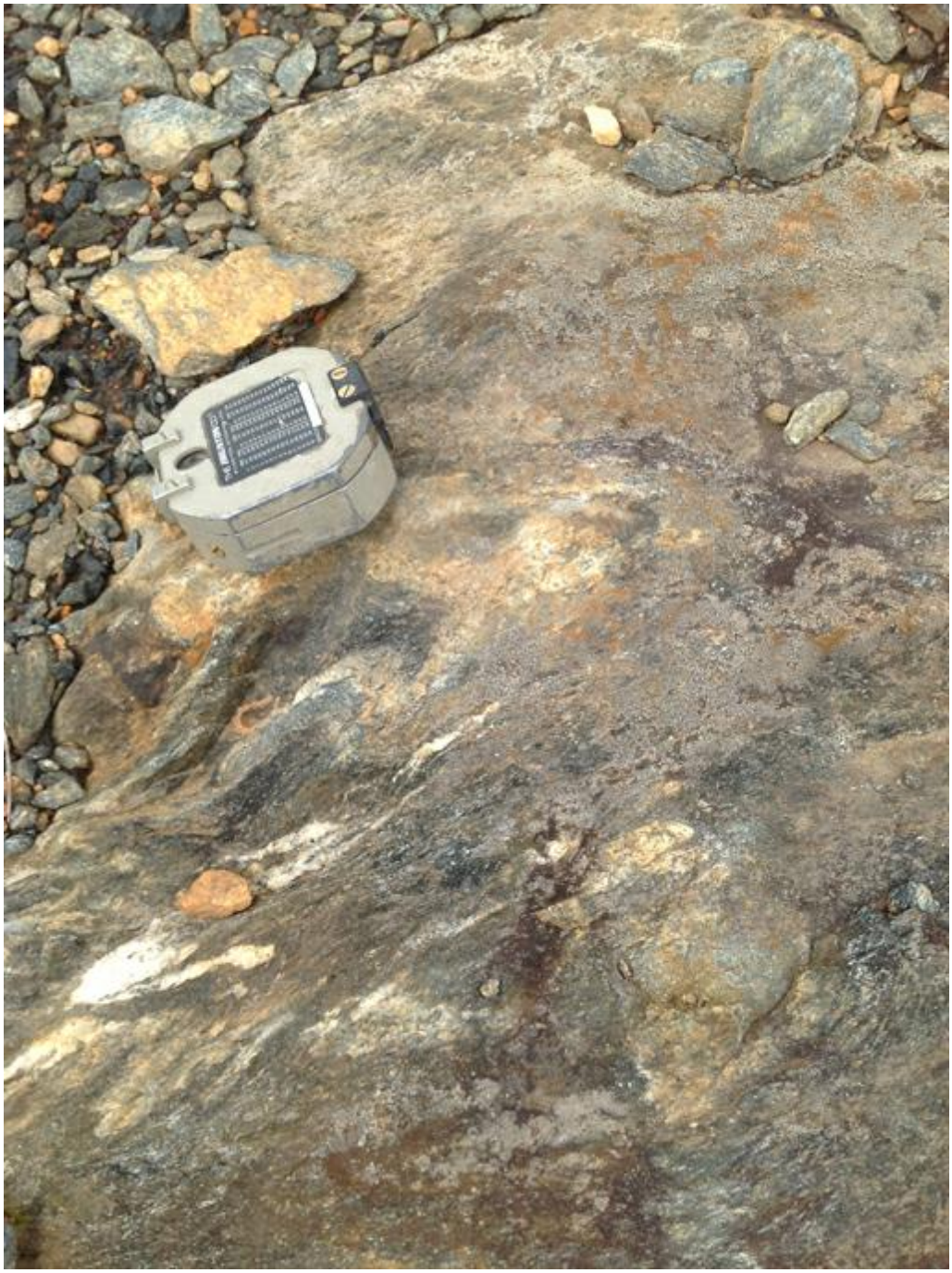
MD-140

F1 folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MD-142

F2 folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MD-148



F2 folding in layered amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MD-247

Terrace. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MD-301

S1 and S2 in bt gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MD-344

Lineation on S2 surface. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-2

Cleavage mullions. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-8

Cleavage mullions. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-57

Sandstone rip-up in conglomeratic quartzite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

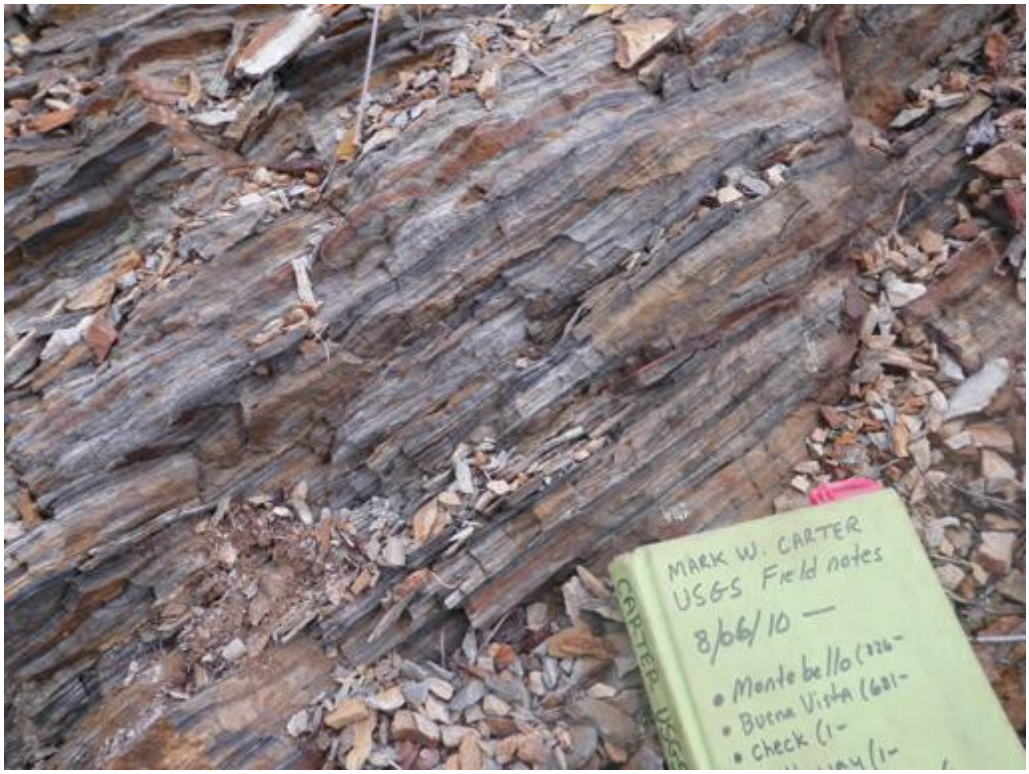
MV-70

Contact between Hampton quartzites and siltstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-71

View to south. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-74

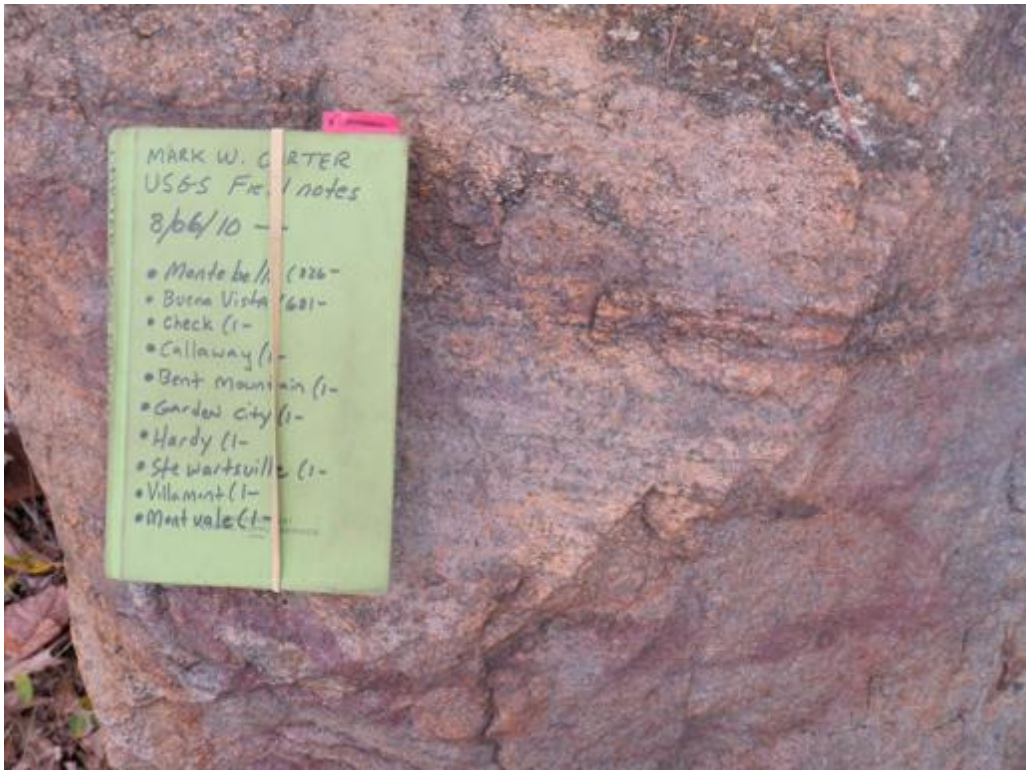


Black banded sandstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-77

Mesoproterozoic foliation in spotty leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-81



Mesoproterozoic foliation in pin-striped layered leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

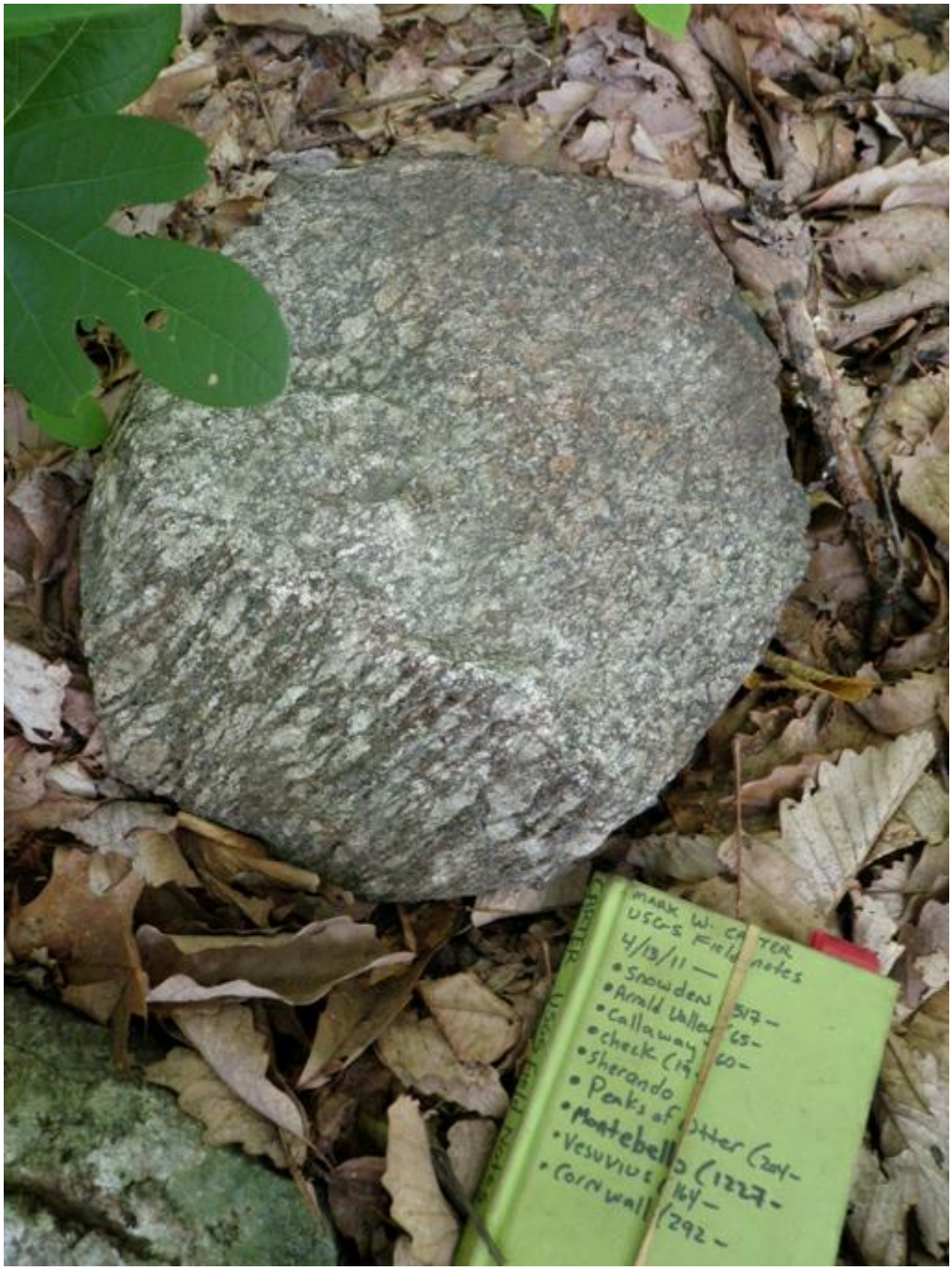
MV-87

Pegmatite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-95

Mylonitic foliation in phyllonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-128



Strongly foliated megaporphyroclastic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-139

Goose creek valley. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-161

Sheared and deformed felsic mylonite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-225

Possible fold. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

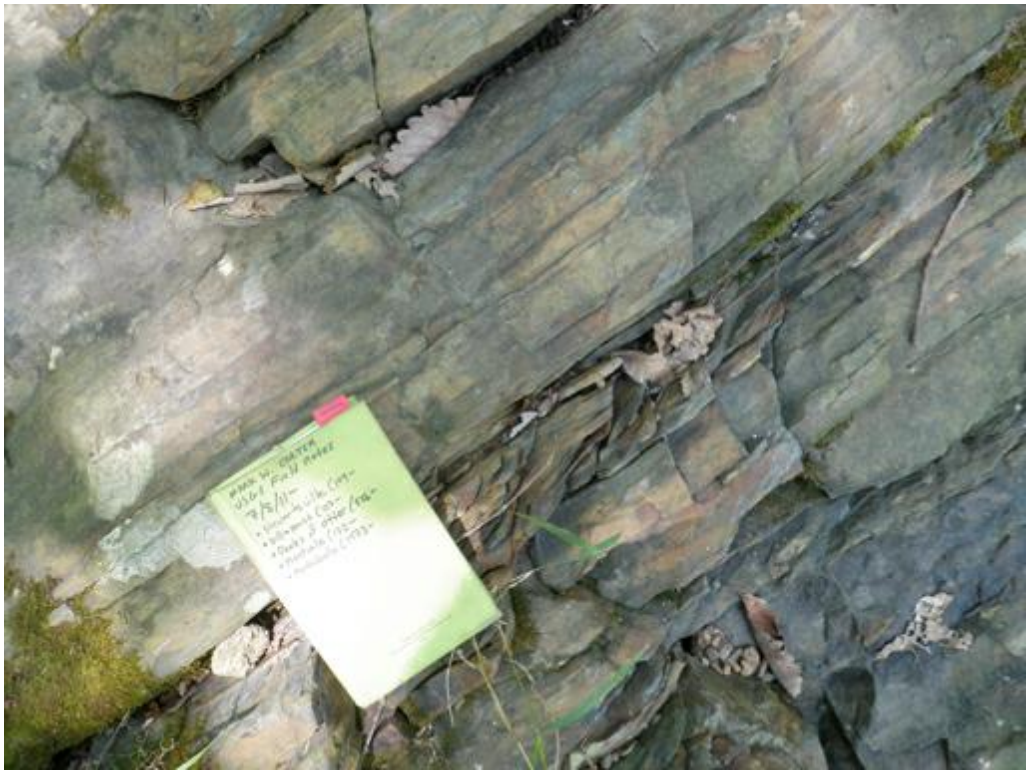
MV-236

Multiple foliations. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-248

Basal conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-266

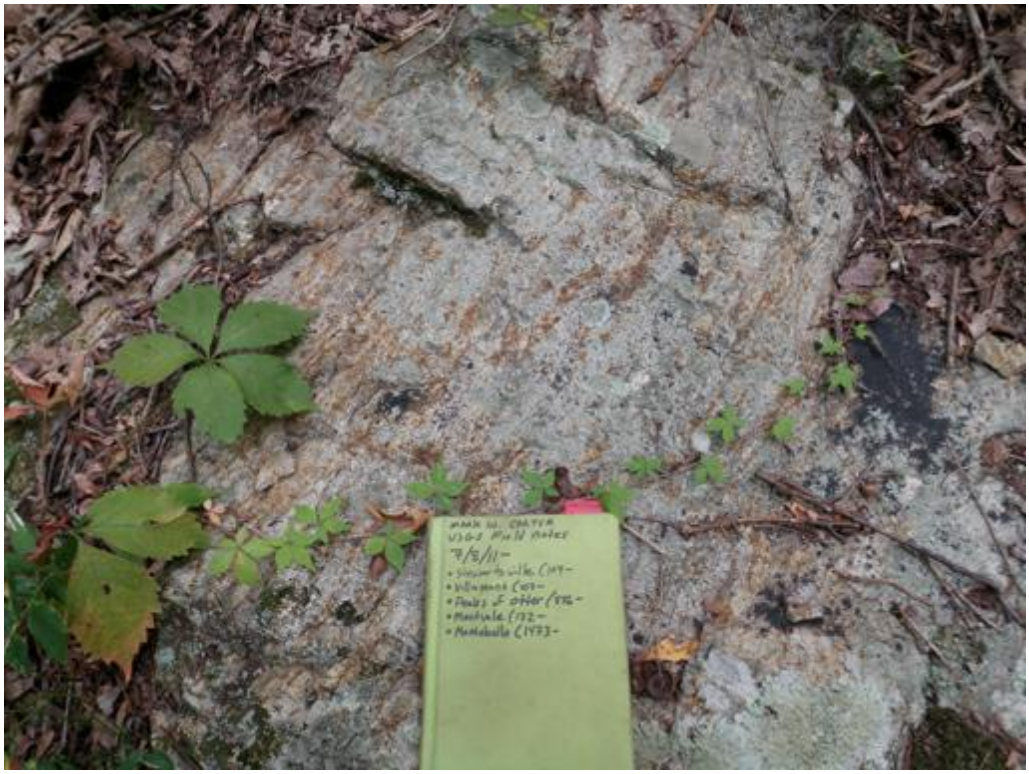


Banded sulfitic slate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-275

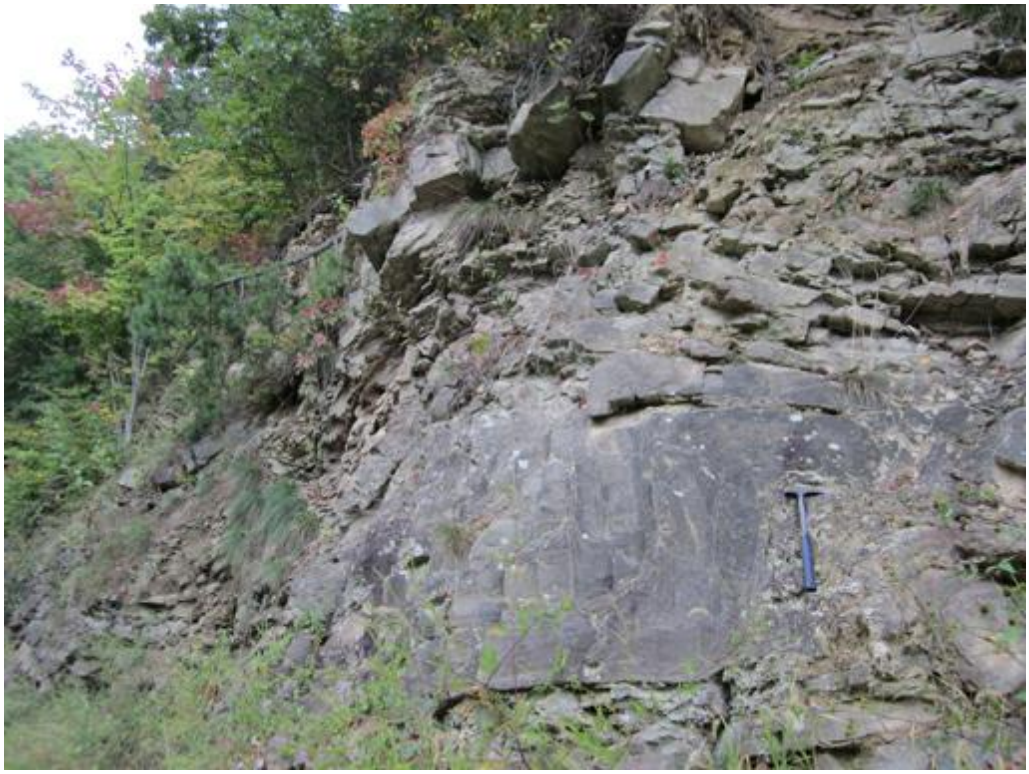
Flat bench, looking east. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-280



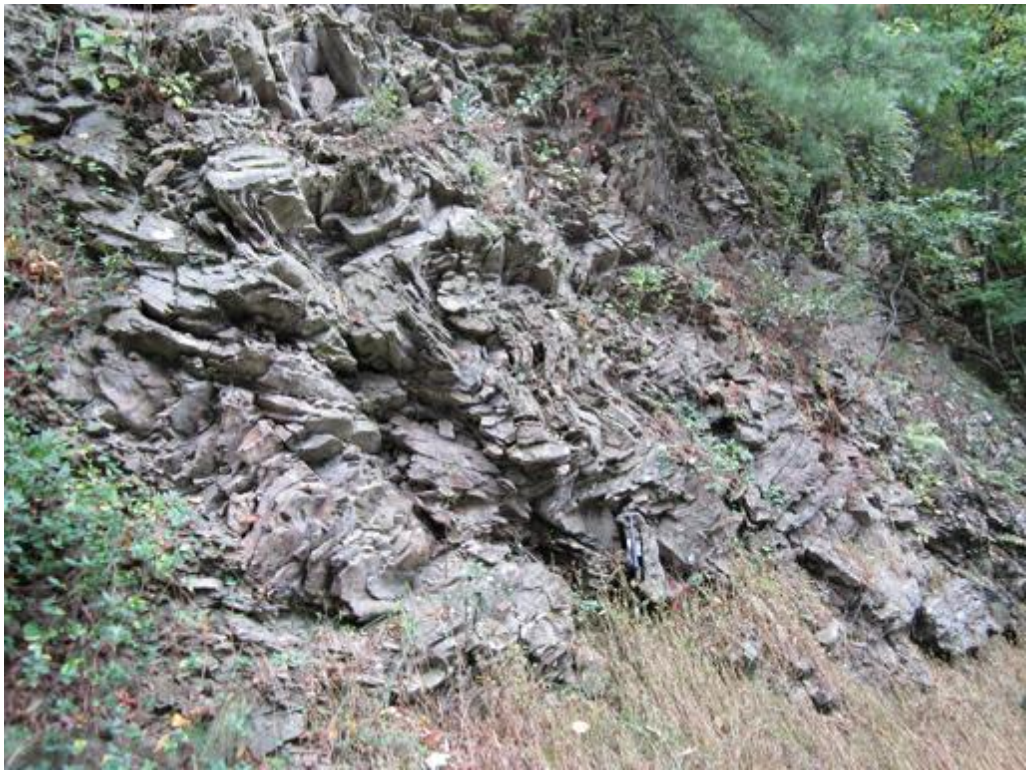
Layering in felsic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-300



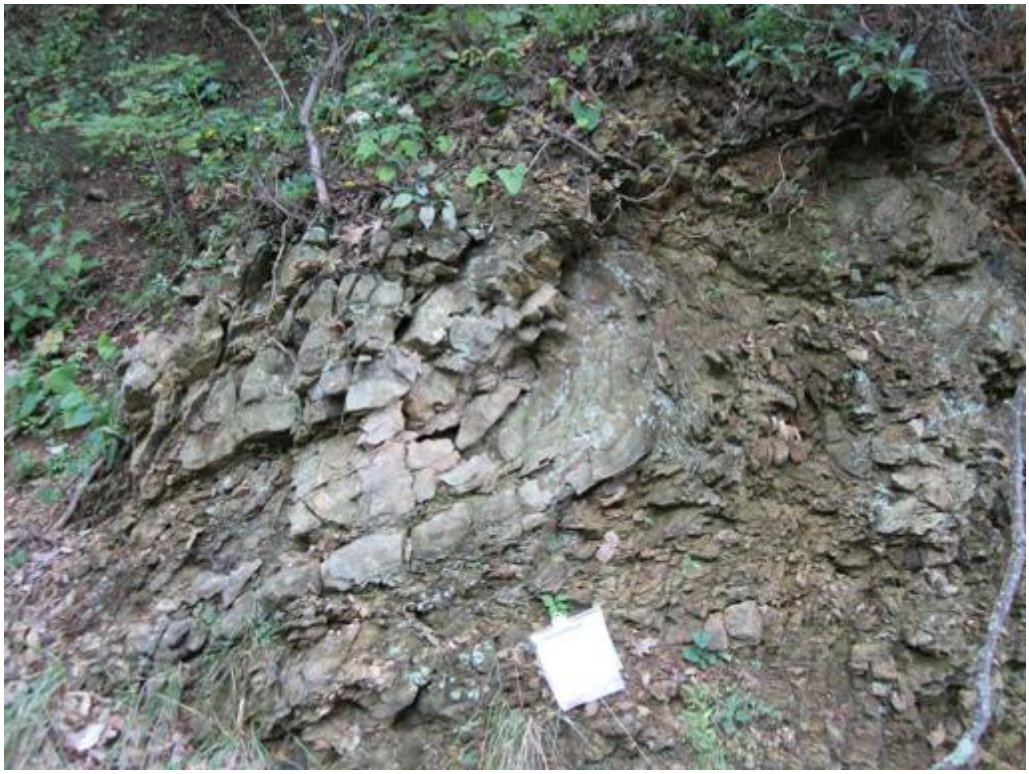
Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-301



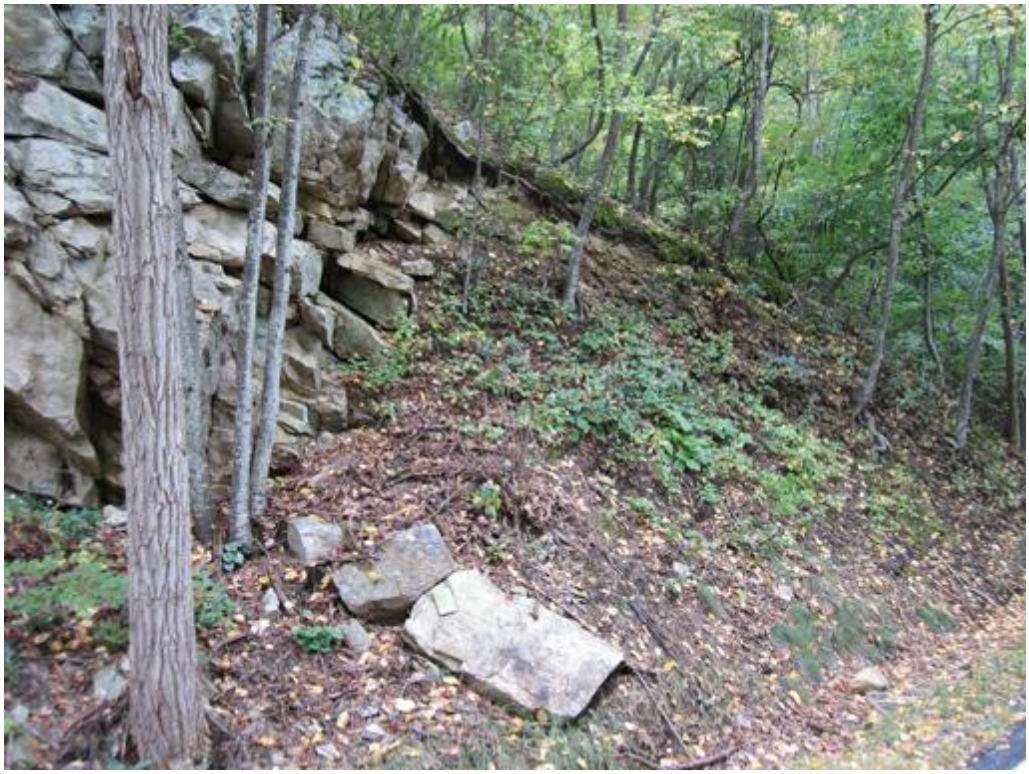
Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-302



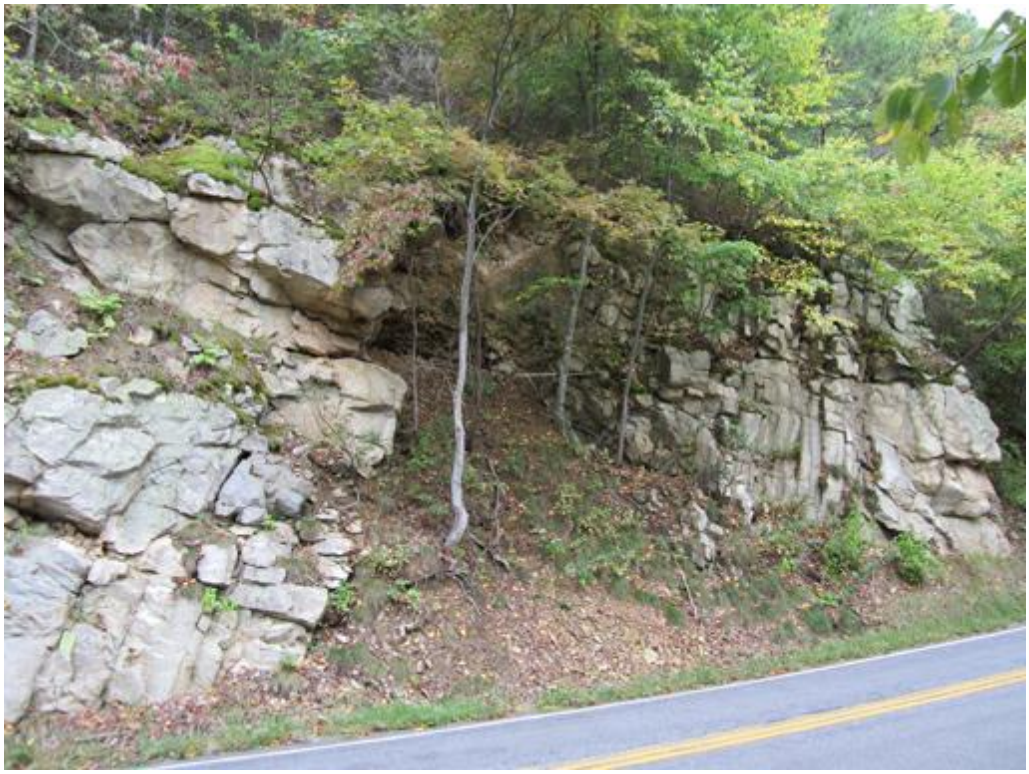
Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-303



Contact. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-304



Quartzite-shale. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-305

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-307

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-308

Quartzite bed on opposite ridge. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-309

Soft sed folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

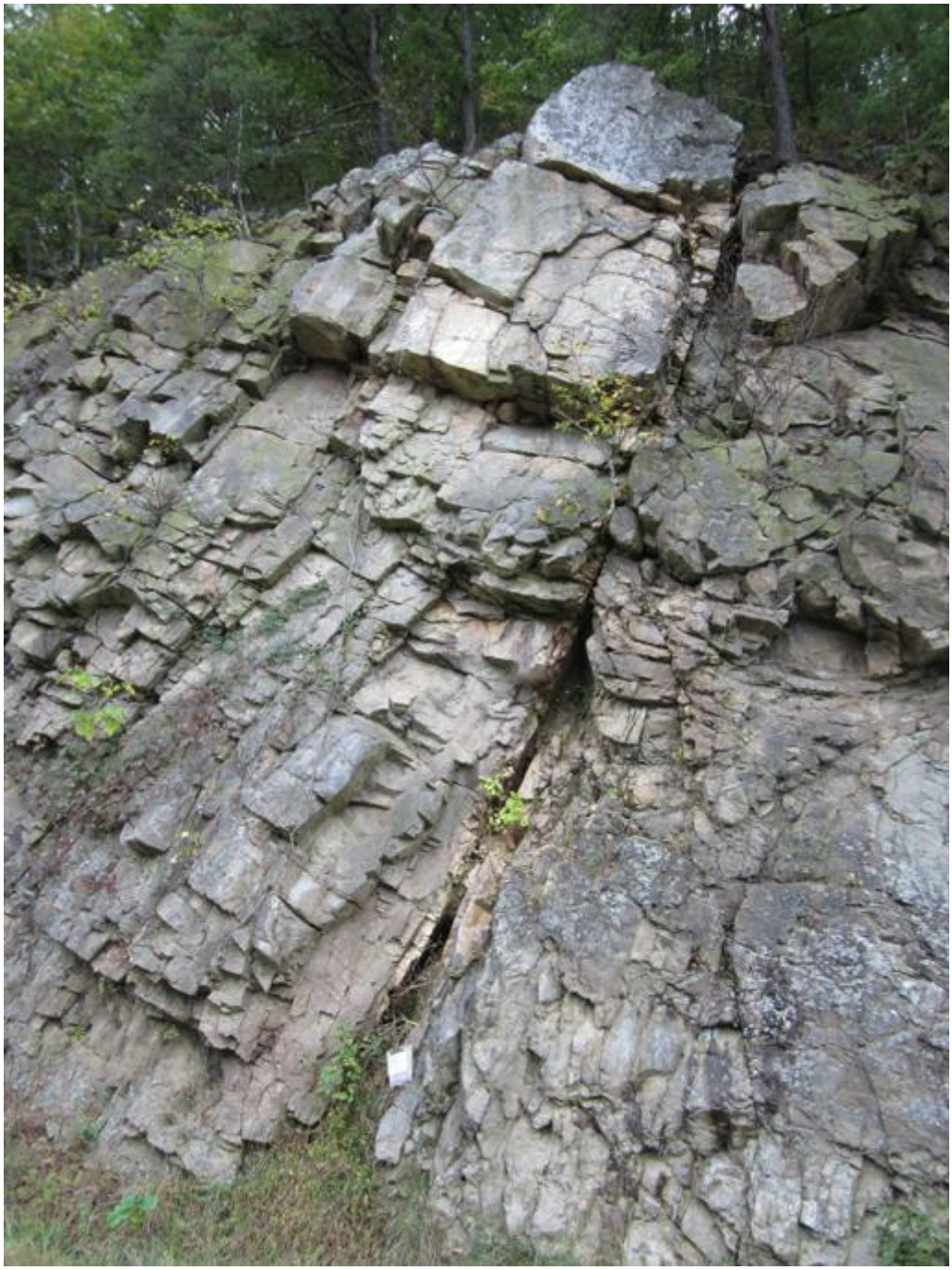
MV-310

Pencil cleavage. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-313

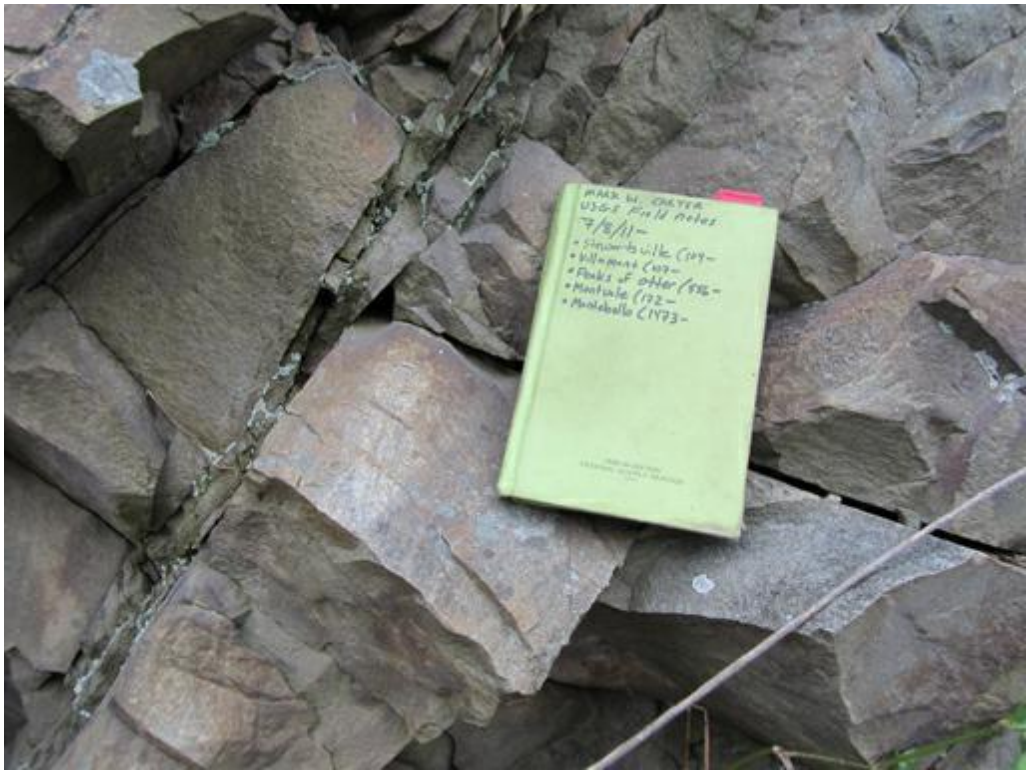
Fold. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-314



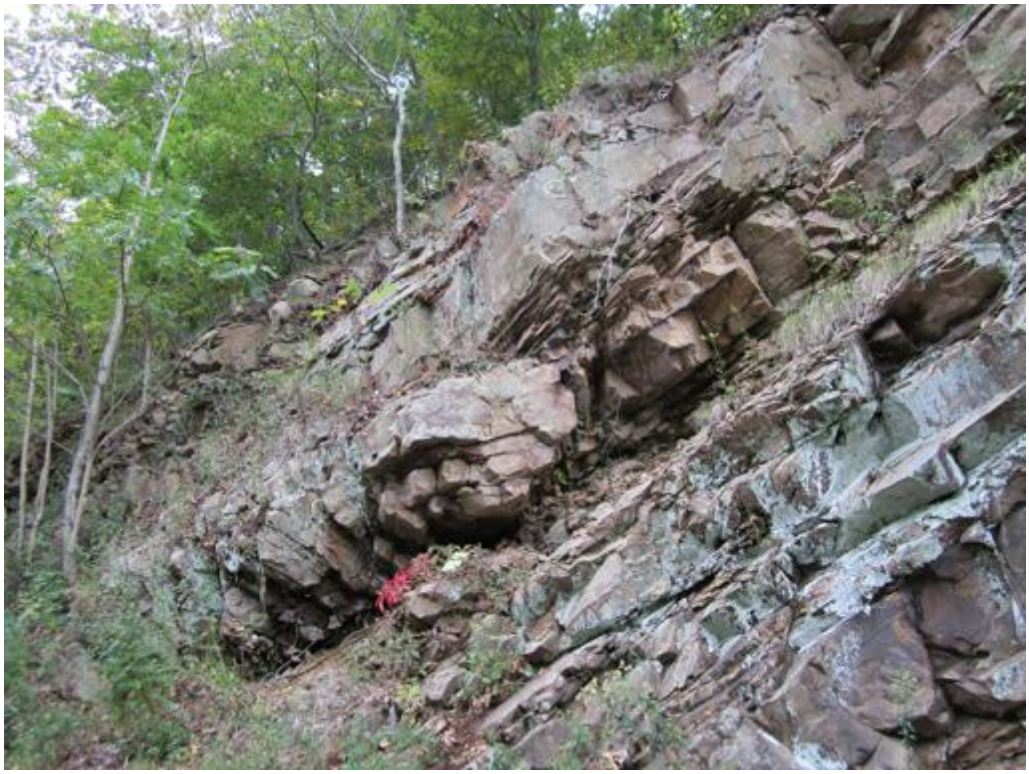
Fault. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-315



Cross-beds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-316



Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-317

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-318

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-320

Fault slip surface. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-330

Slicks on foliation surface. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-333

SW-dipping foliation in quartz-rich rock. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-337

West-dipping Joint in leucobasement. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-338

Slicks on secondary spaced cleavage face. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

MV-340

Pencil cleavage. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-5

Older foliation in charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-9

Xenolith in charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-33

Megacrystic leucocratic charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-63

Old foliation in coarse charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-133

View to west. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

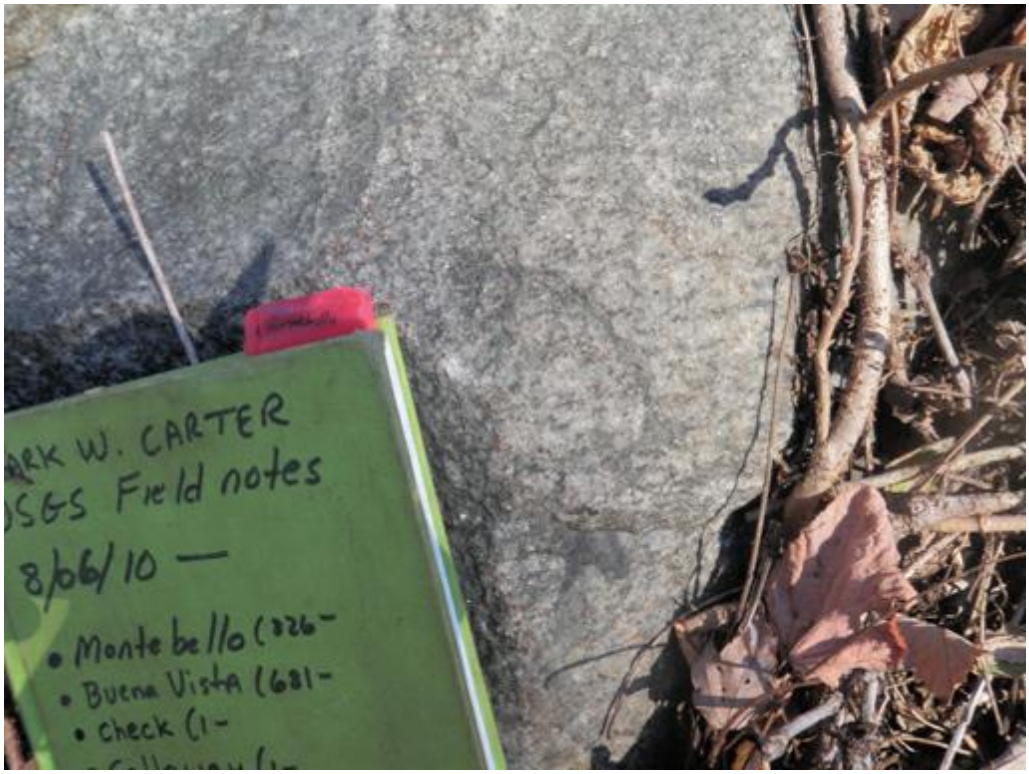
PO-137

Garnetiferous pin-striped gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-147

View of Flat Top Mountain. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-149



Layered leucocharnockitic spotty gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

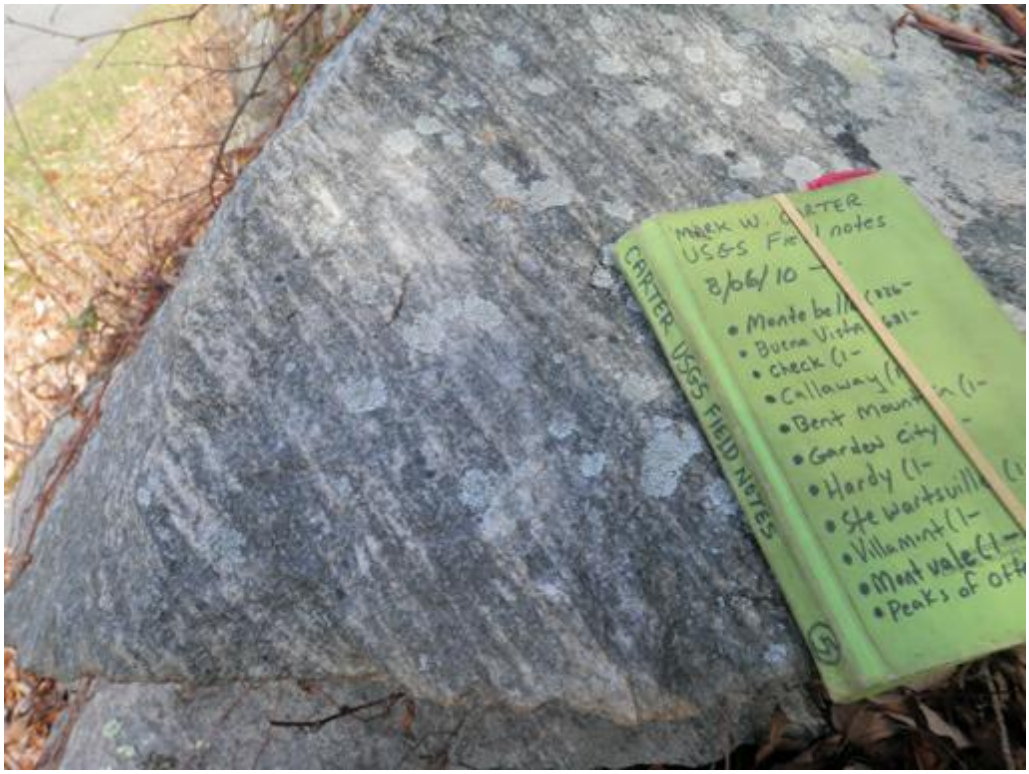
PO-176

Layered leucocharnockitic streaky gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-195

Garnetiferous layered charnockitic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-196

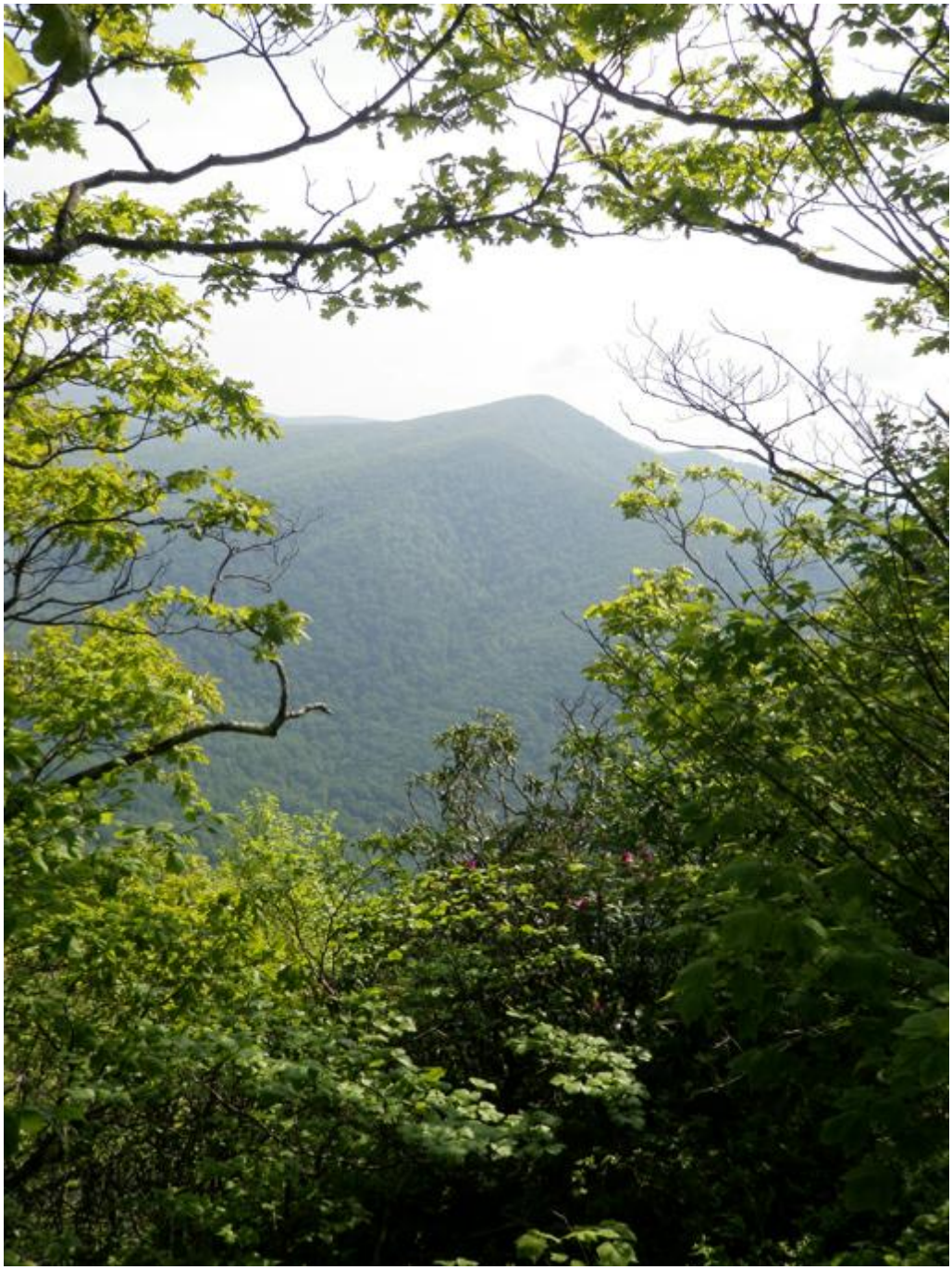


Well layered charnockitic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-215

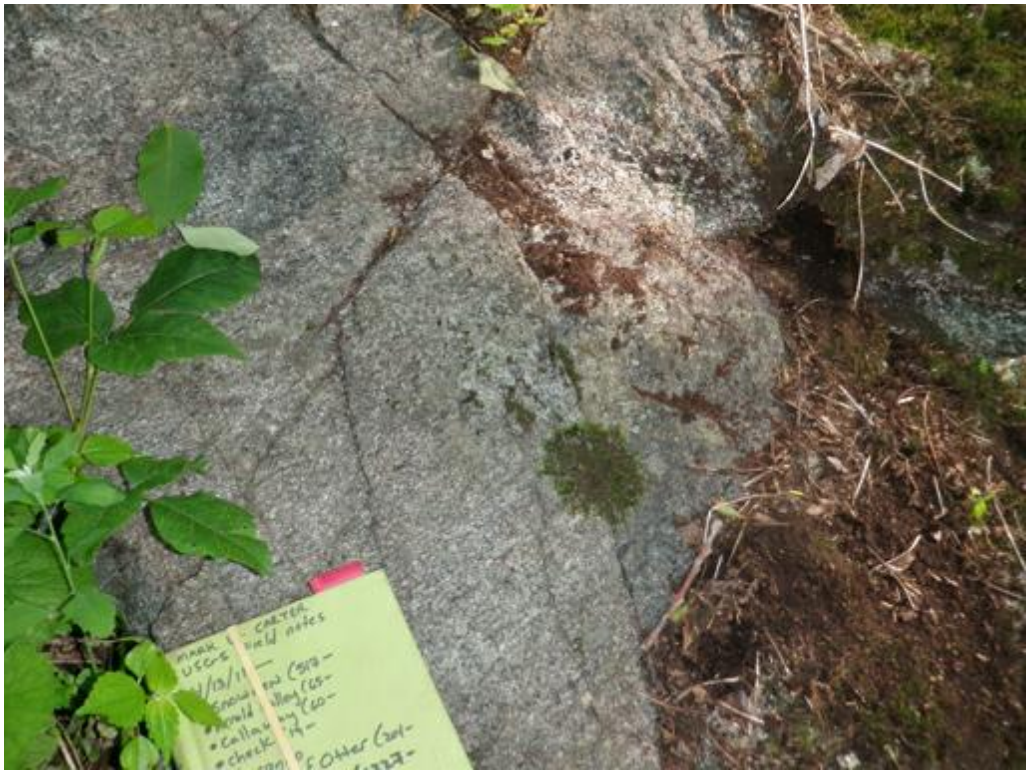
View. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-266



View of Onion Mountain from Headforemost Mountain. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-312



Pod of quartz-feldspar within charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

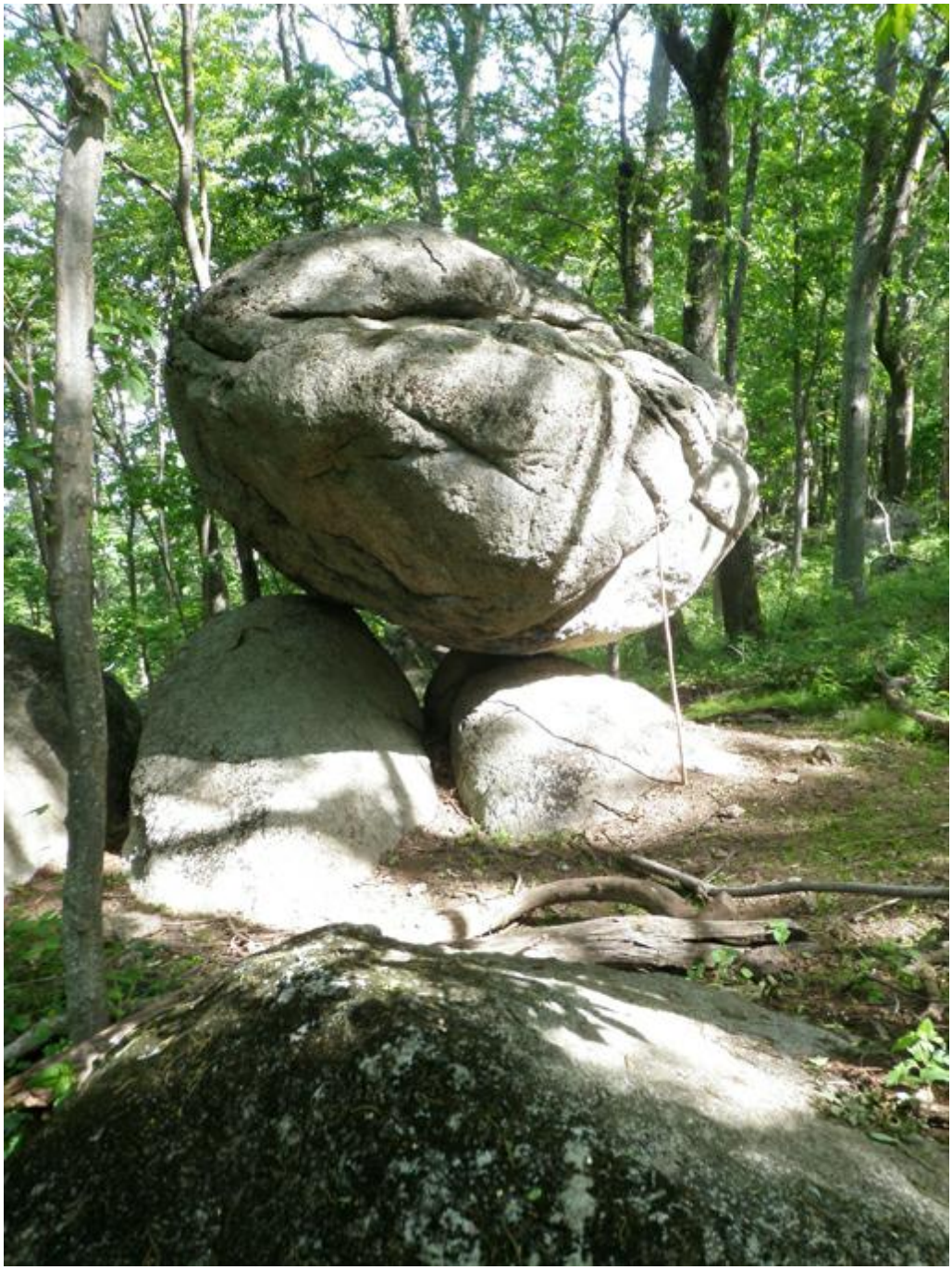
PO-337

Pod of quartz-feldspar within charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-370

Foliation in megacrystic charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-371



Balance rock 2. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

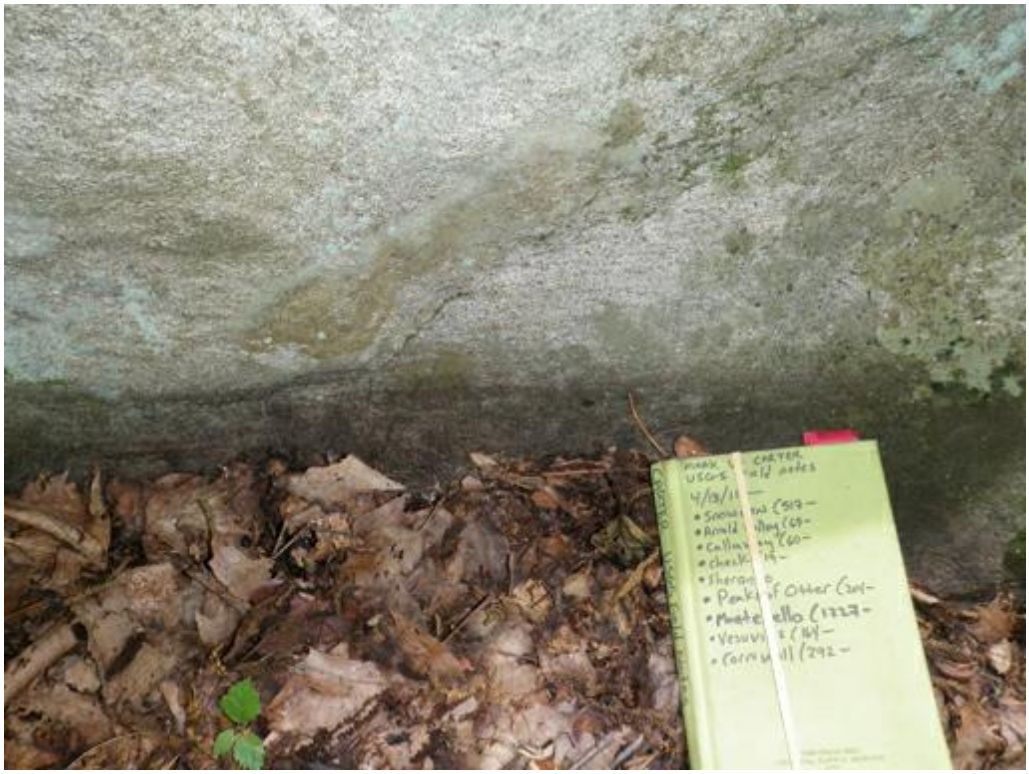
PO-404

Pin-striping in Beverlytown gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-405

High cove pond. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-406

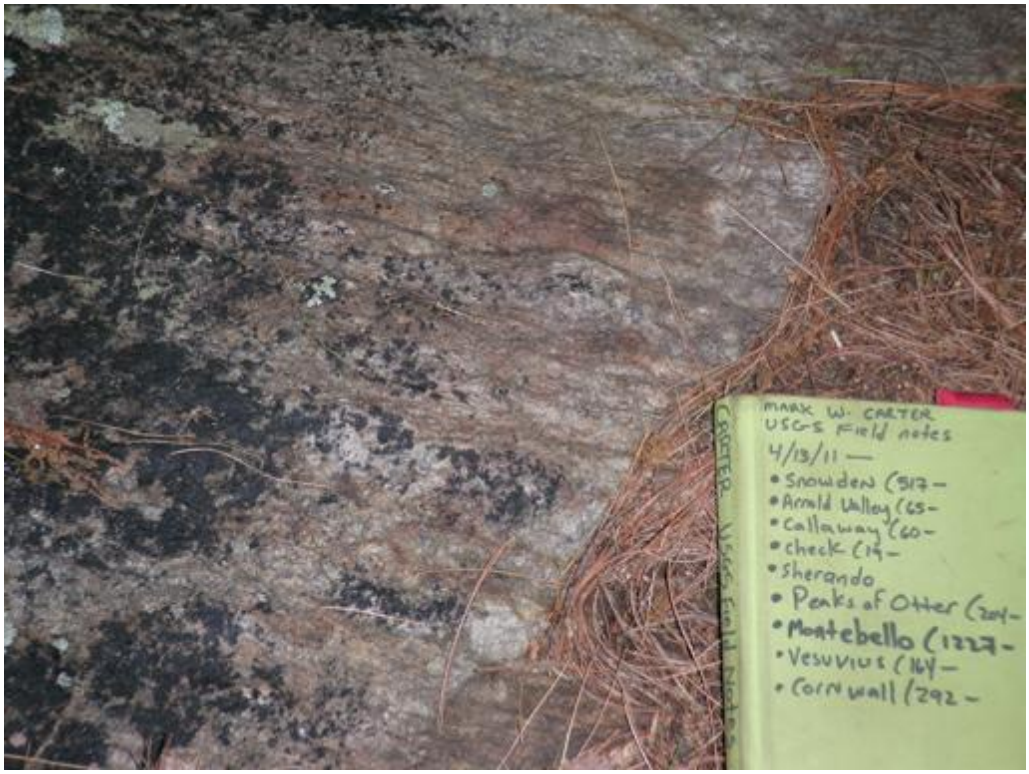


Pin-striping in Beverlytown gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-420

Layered mesogranitoid gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-460



Foliation in leucogranitoid gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

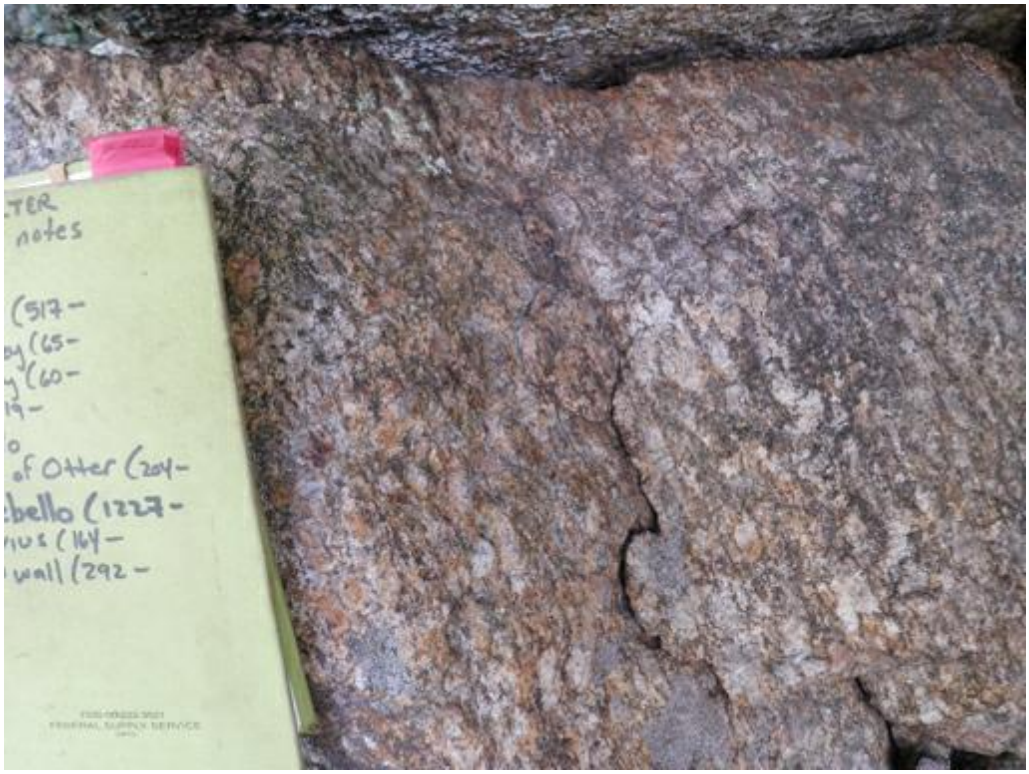
PO-495

Lineated granitic mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-507

Coarse splotchy leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-541



Foliated megaxtic. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-548

Boulder field. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

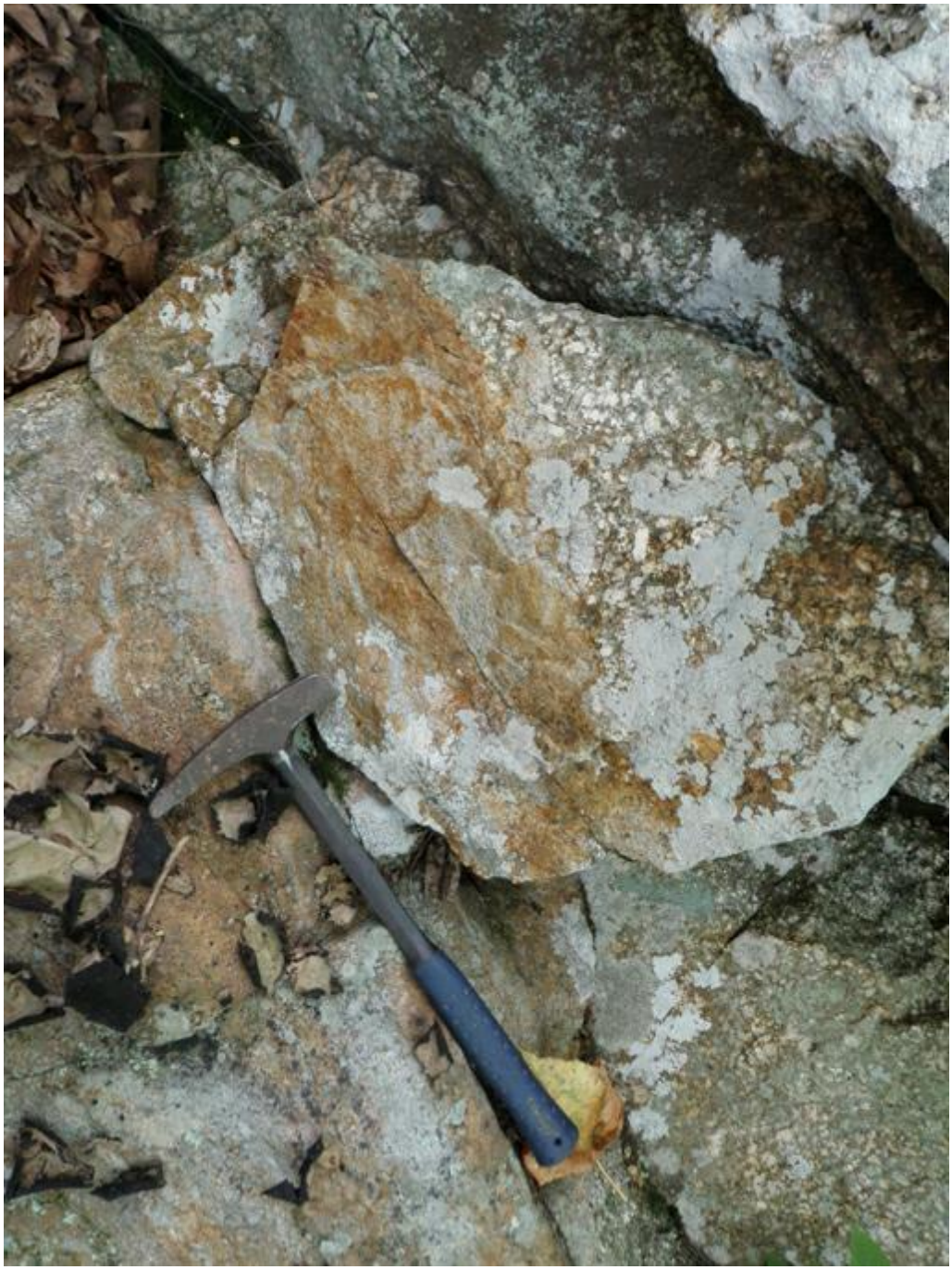
PO-603

Foliation in charnockitic augen gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-612

Dike of fine-grained granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-613

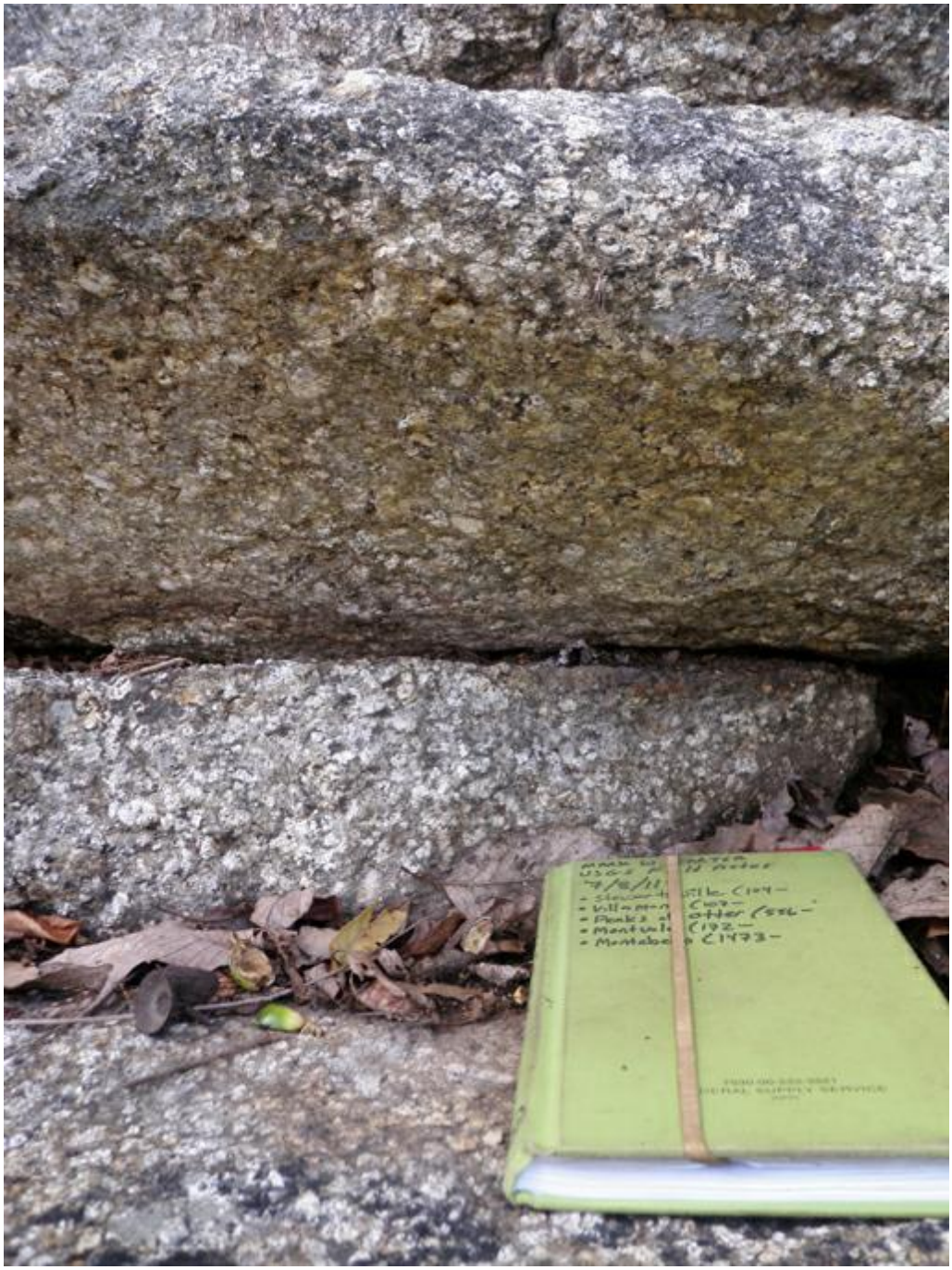


Dike of fine-grained granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-614

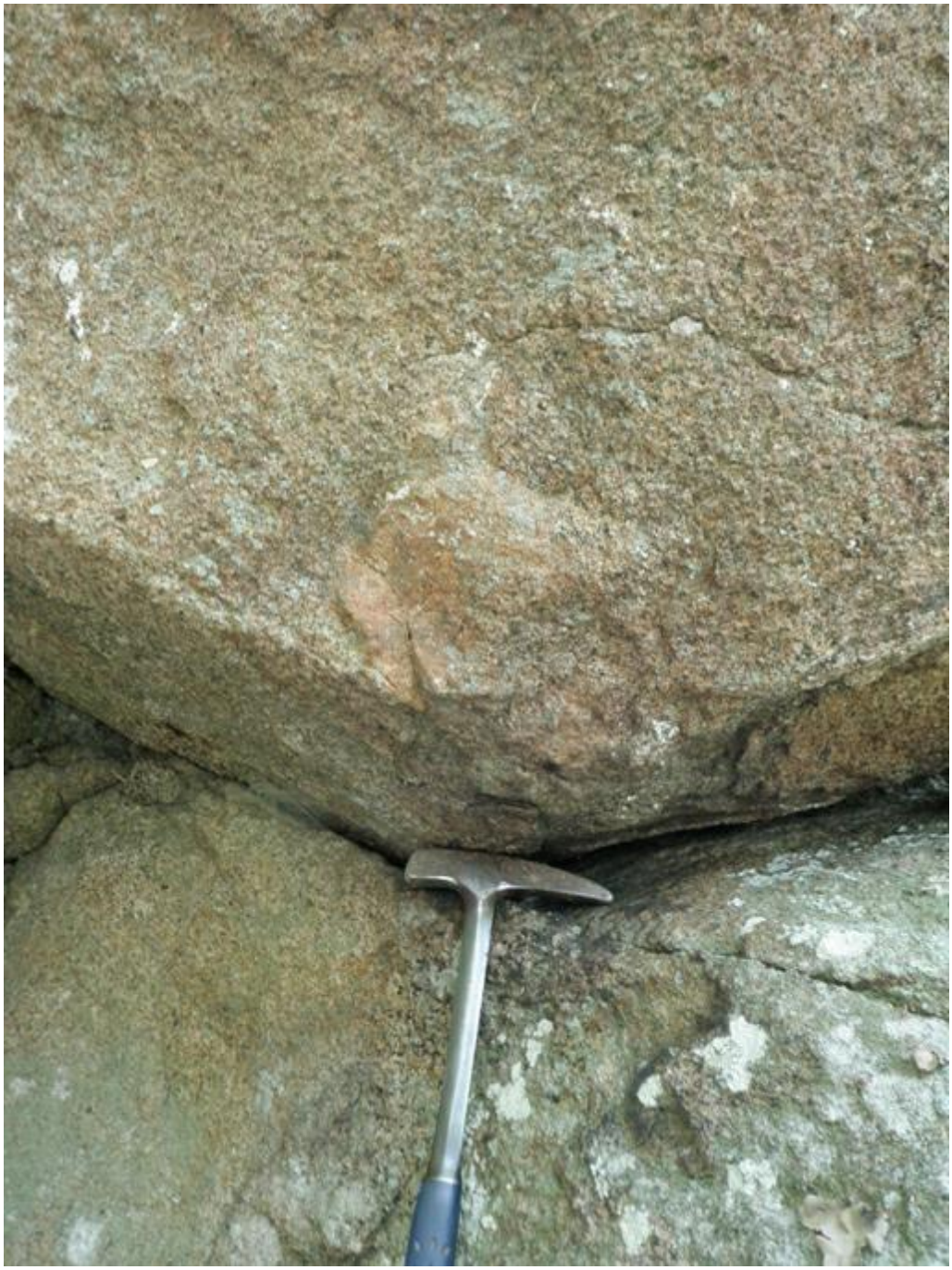
View of Wheats Valley north. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-616



Coarse-grained charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-635



Felsic xenolith within fine-grained charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

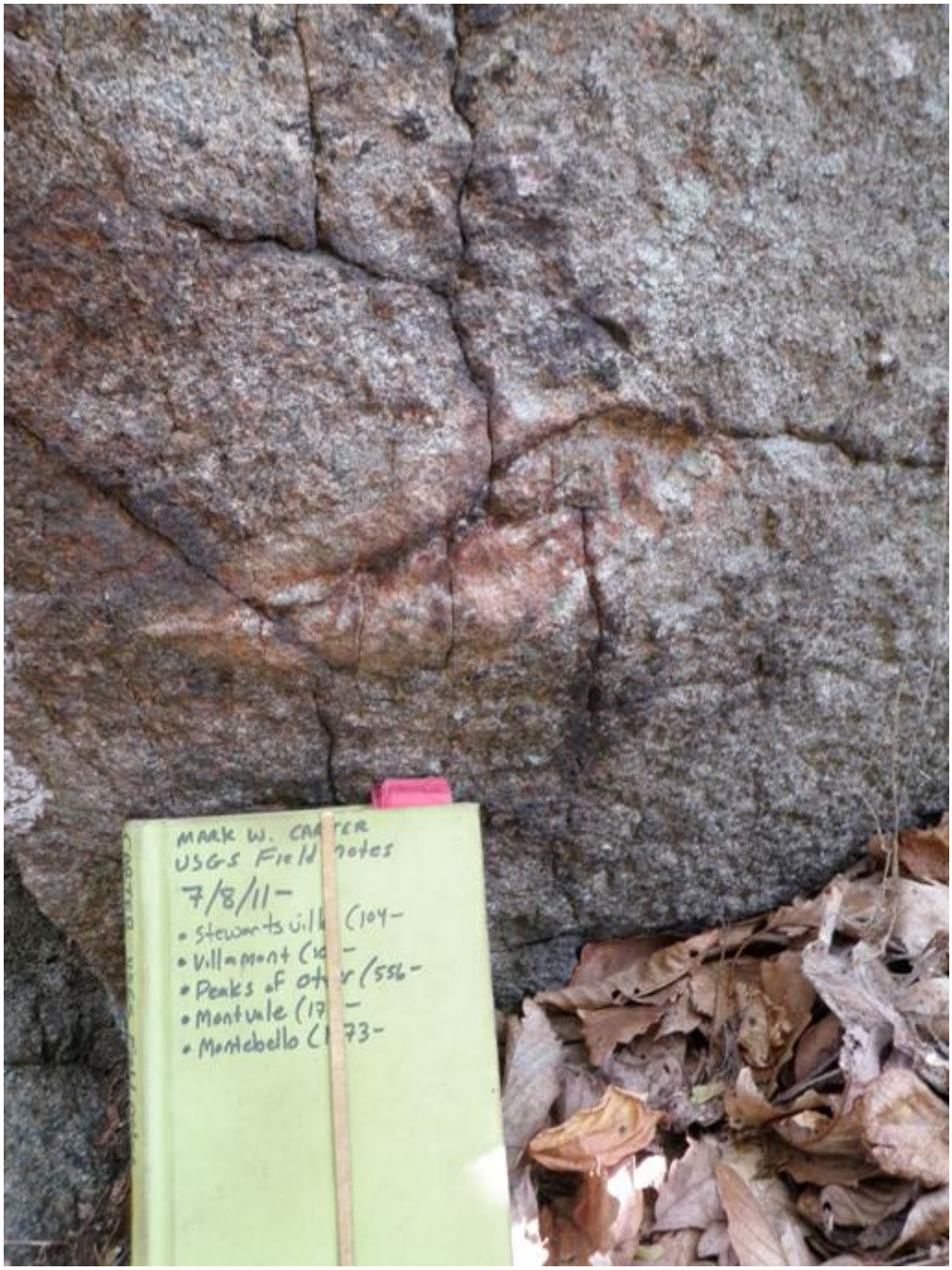
PO-636

Quartz-feldspar-tourmaline pegmatite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-637

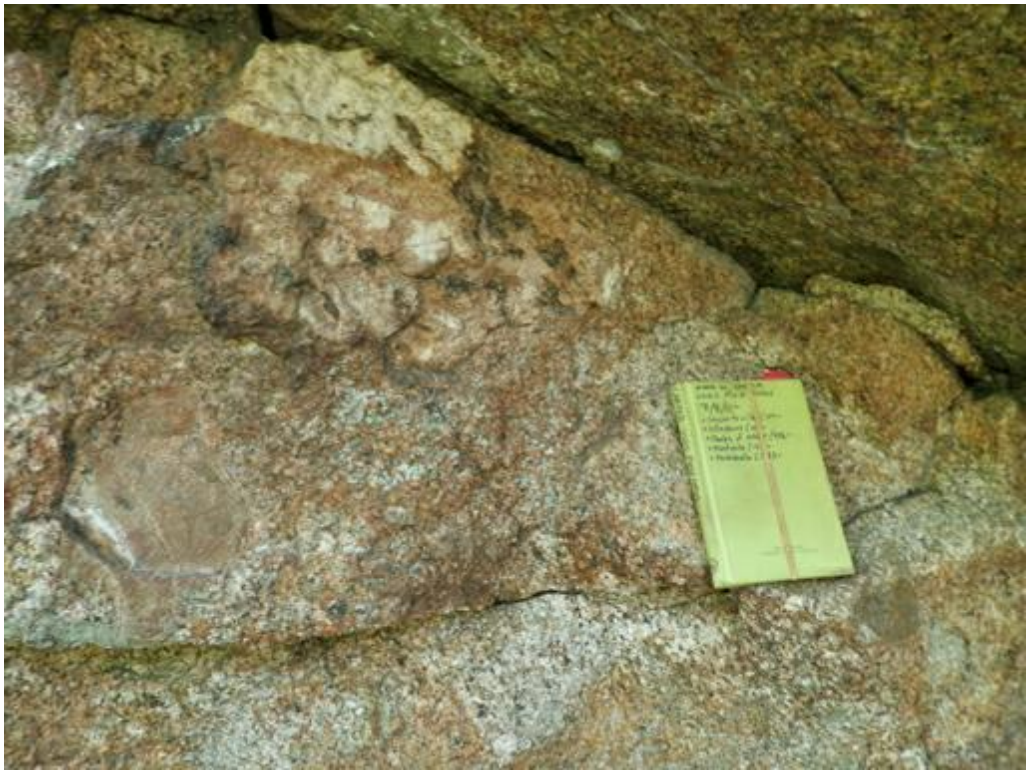
Calm before the cliffs. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-646



Felsic xenolith within fine-grained charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-649



Coarse-grained charnockite with gneissic xenoliths. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-651

Layered felsic gneiss float. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

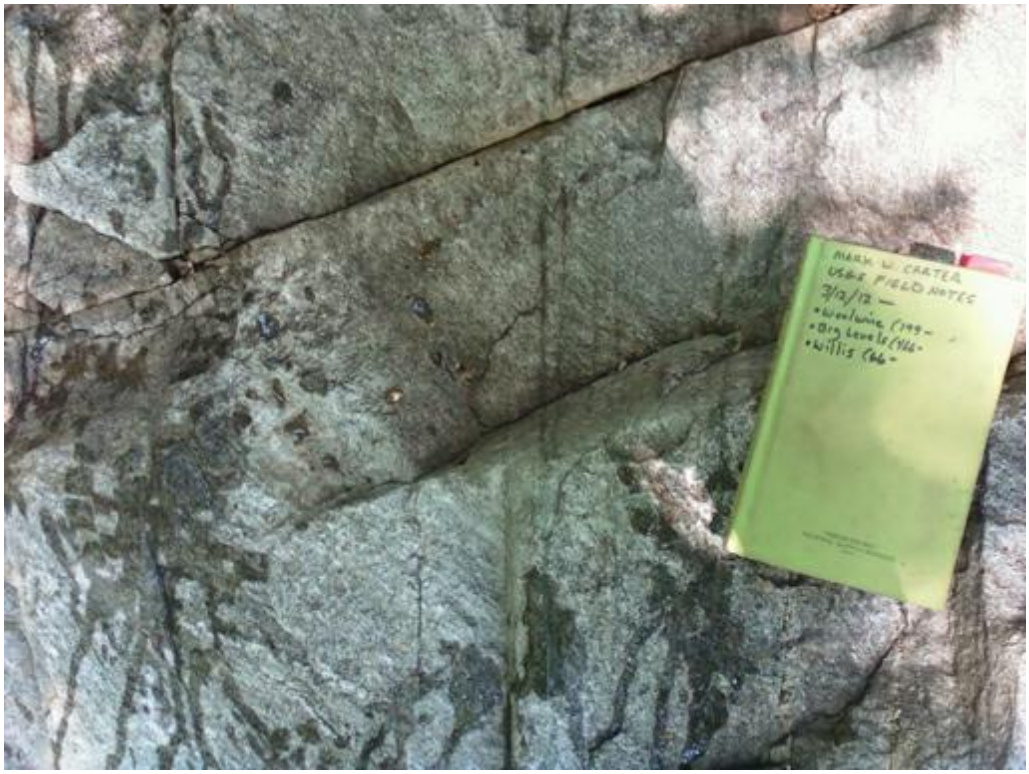
PO-660

Layered granitoid gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-677

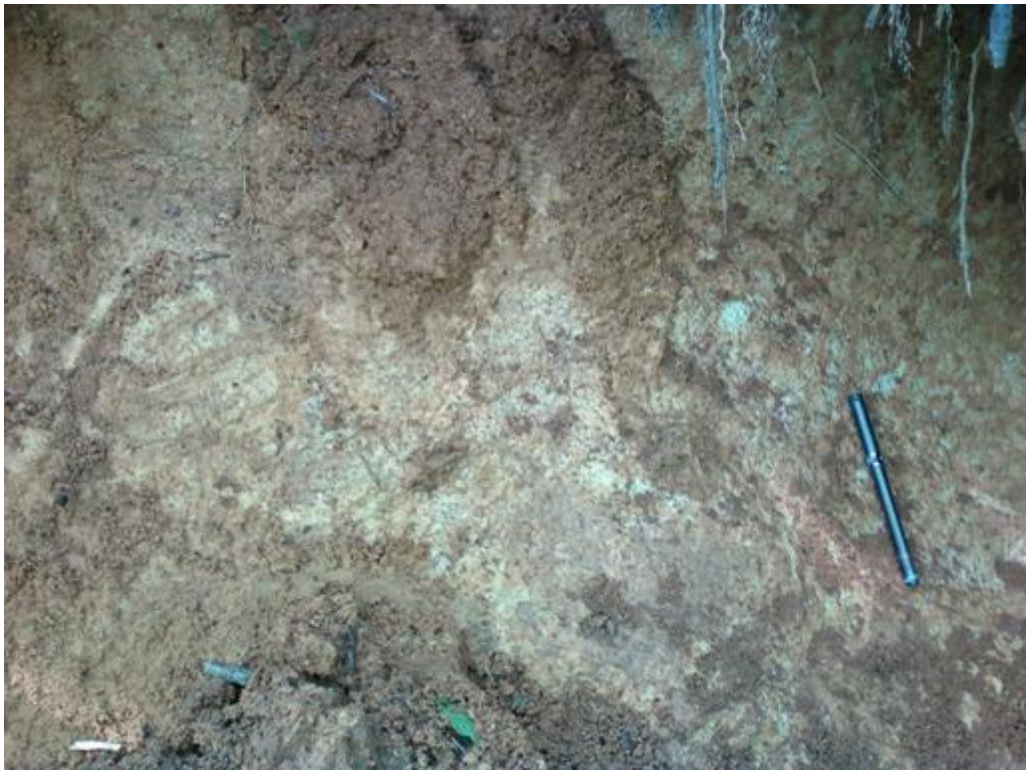
View of Wheats Valley East. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-713



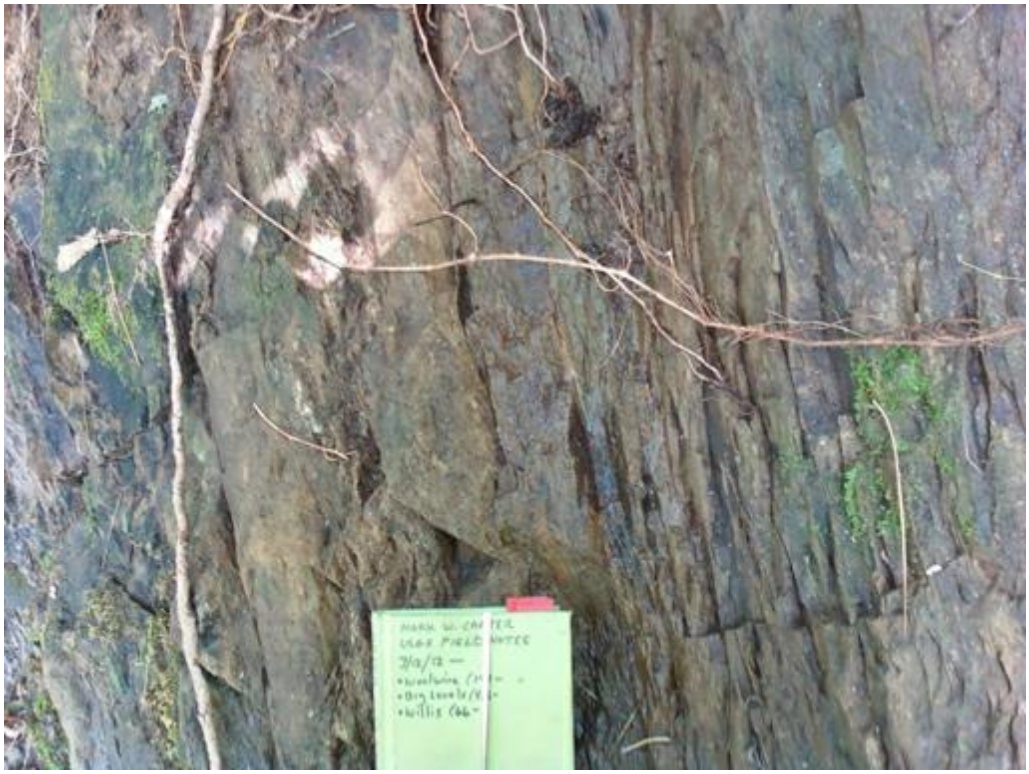
Statons Creek gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-714



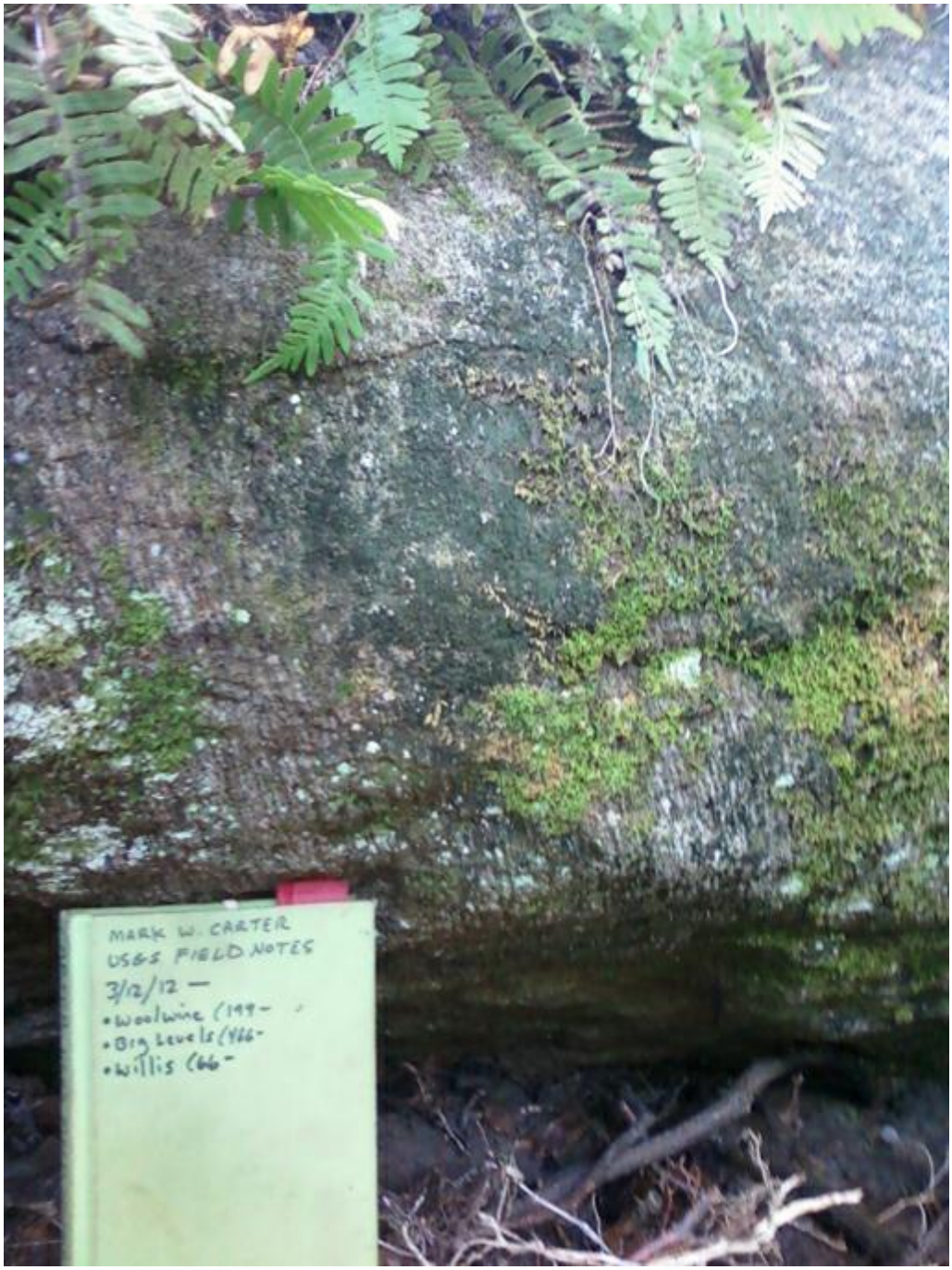
Xenoliths of gneiss within granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-715



Mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-716



Statons Creek gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-722

Sheared gneiss and charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

PO-726

Folded Statons Creek gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-22

Amygduloidal Catoctin basalt. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-27

Metavolocaniclastic tuff in Catoctin. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-31

F1 fold in Catoctin. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-32

F2 folds in Catoctin. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-53

F2 fold in Catoctin. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-61

Cleavage mullions in Catoctin. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-73

Amygdules in Catoctin basalt. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-116

Interbedded sandstone and conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-140

Banded siltstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-156

Paleozoic foliation in charnockitic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-157

Paleozoic foliation in charnockitic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-158

Mesoproterozoic foliation in charnockitic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-162

Megacrsytic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-166

Megacrystic quartz monzonite granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-186

Pin-striped granulite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

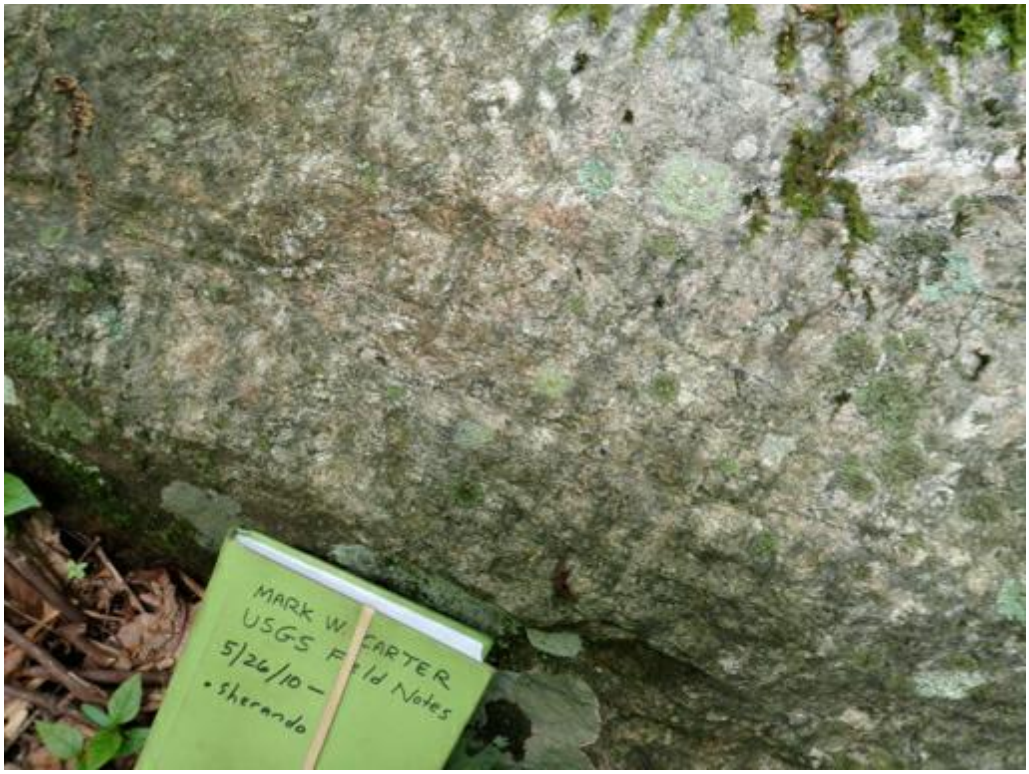
SH-195

Megacrystic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-199

Shear bands in megacrystic charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-200

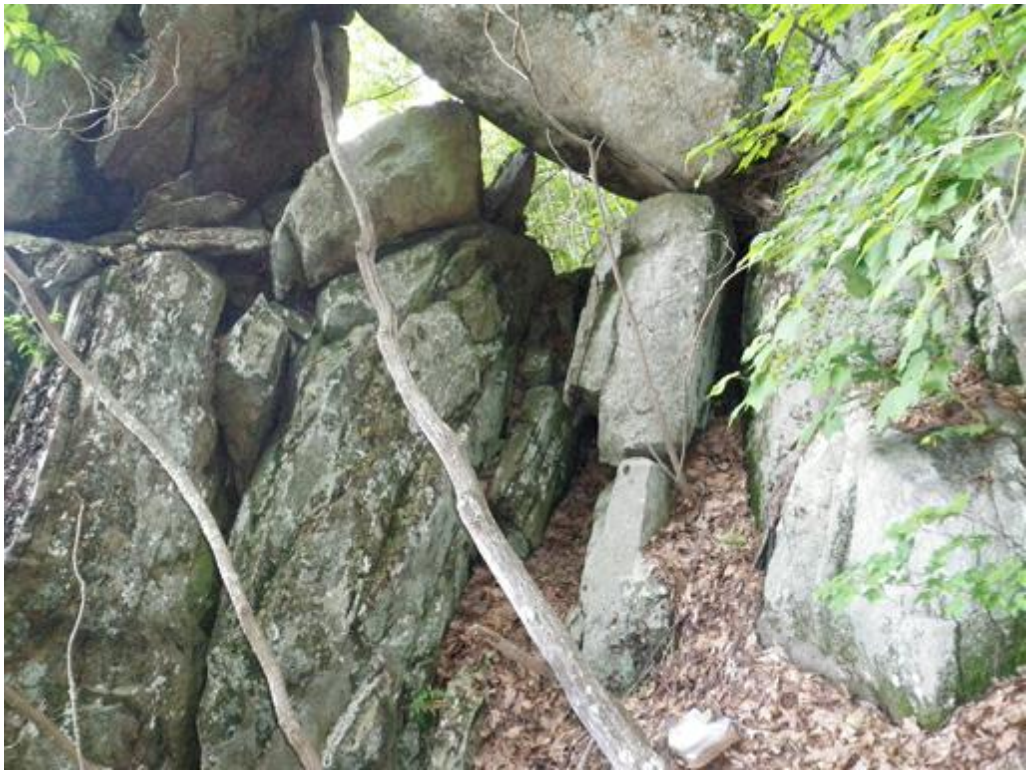


Mesoproterozoic foliation in megacrystic charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-201

Mafic dikes cross-cutting megacrystic charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-208



Young charnockite dike. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-211

Layered gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-212

Pin-striped mesocratic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SH-213

Pin-striped mesocratic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-8

Garnetiferous leucocharnockitic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-9

Hopper Creek Valley. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

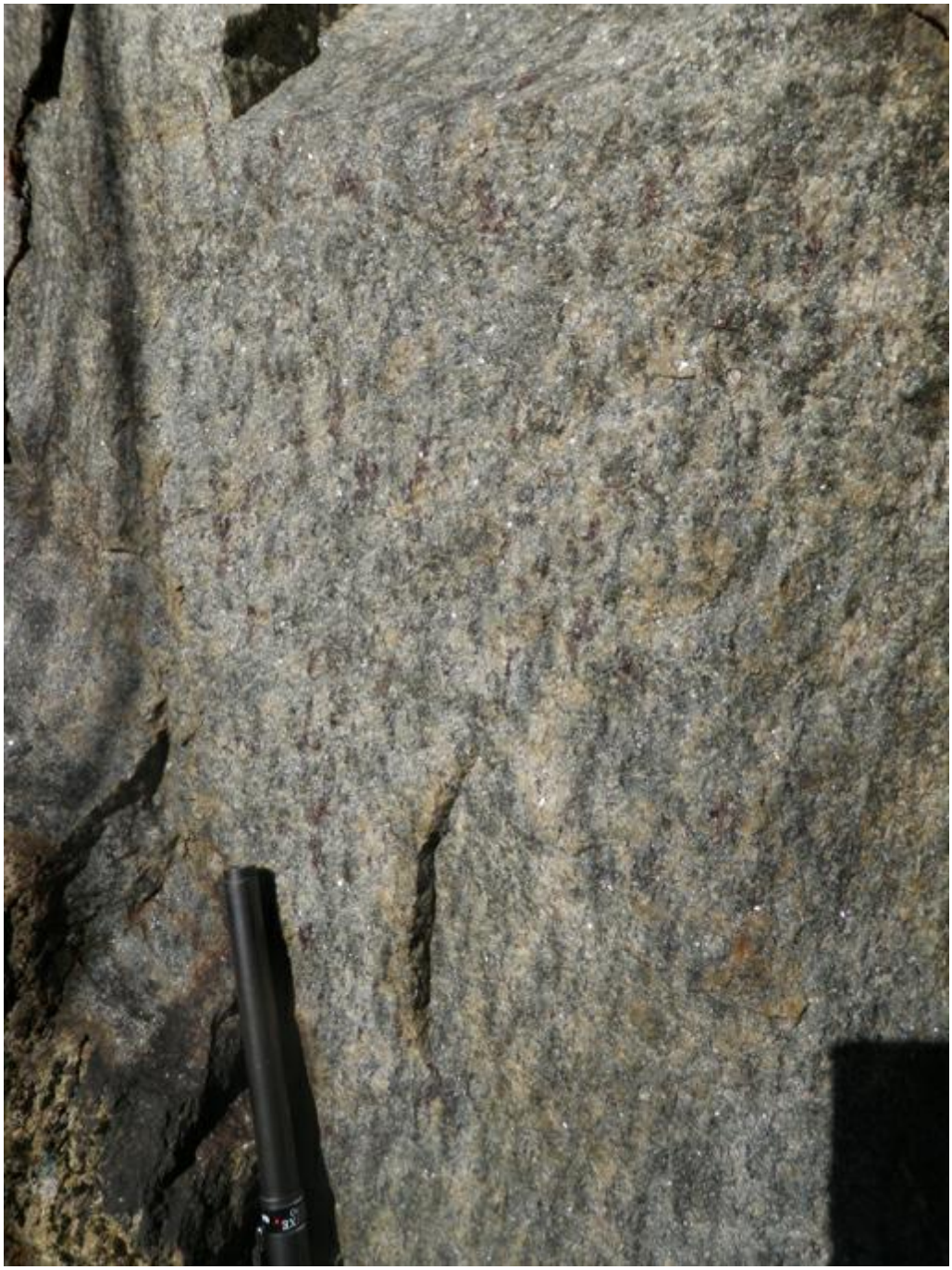
SN-10

Megacrystic quartz-feldspar dike cross-cutting leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-19

View to east. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-22



Well layered garnetiferous leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-31

View of Piedmont to east. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-33

View of Piedmont to east. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-40

Garnetiferous leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-54

Cross-cutting quartz-feld leucogranitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-57

Foliated spotty leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-66

Garnetiferous spotty leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-67

Charnockitic spotty gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-71

Charnockitic spotty gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-84

Spotty leucogneiss Mesoproterozoic foliation. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-88

Cross-cutting OPX-quartz-feld dikes. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-92

Foliated charnockitic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

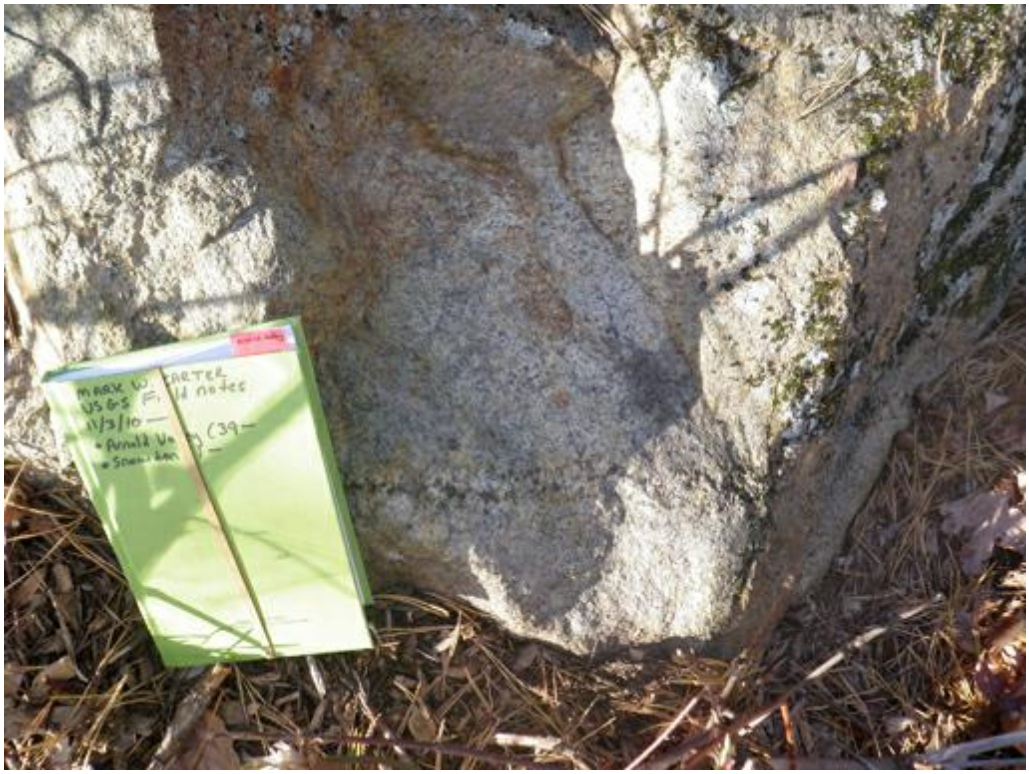
SN-95

Mylonitic mesocratic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-97

Colluvial debris flow. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-101



Cross-cutting quartz-feldspar dike. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-104

Cross-cutting porphyritic gabbro. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-109

Cross-cutting charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-116

Well layered granodioritic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-123

View to southeast. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-124

Well layered gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

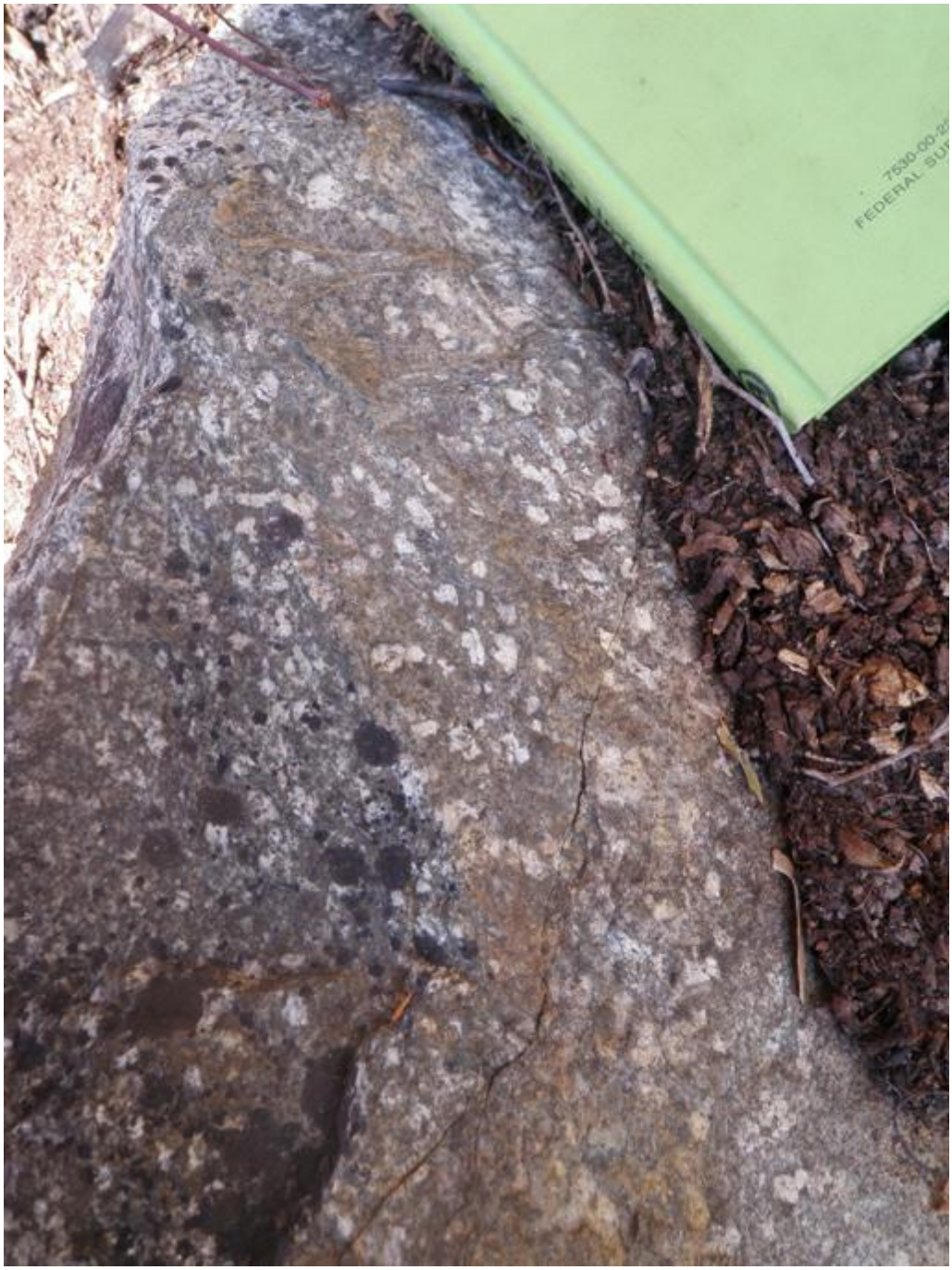
SN-125

Coarse splotchy gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-126

Coarse splotchy gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-132



Paleozoic foliation in charnockite dike. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

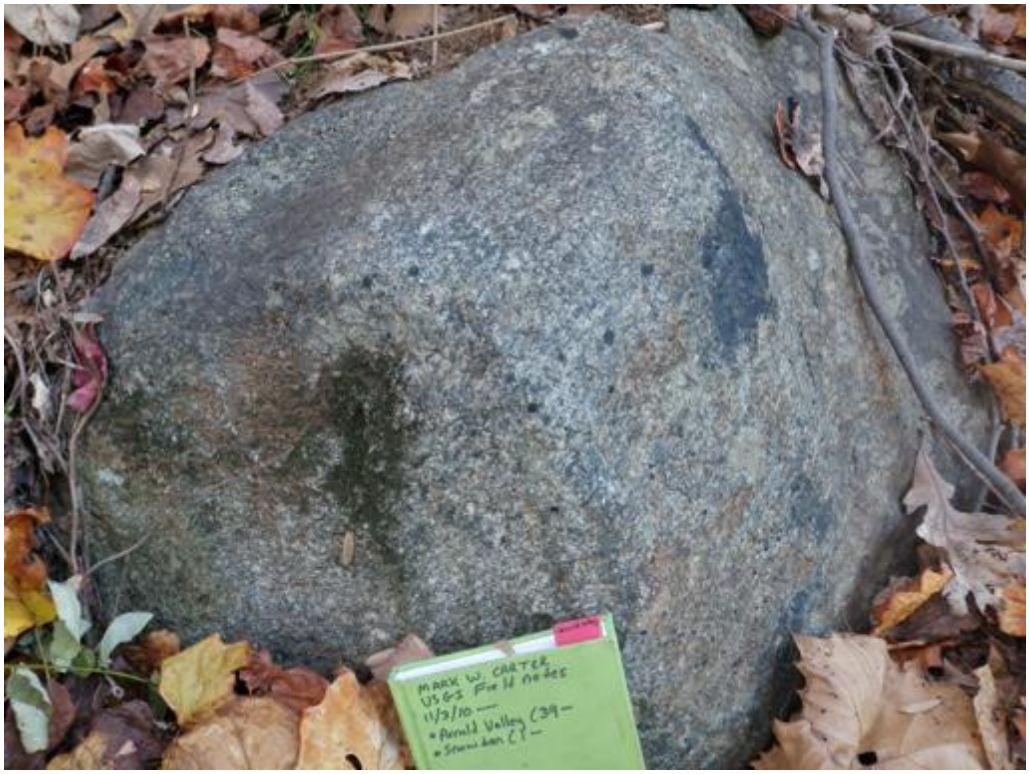
SN-133

Intrusive porphyritic charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-134

Paleozoic foliation in porphyroclastic charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-156



Well-layered mesocratic charnockitic gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-160

Mesoproterozoic and Paleozoic foliations in leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

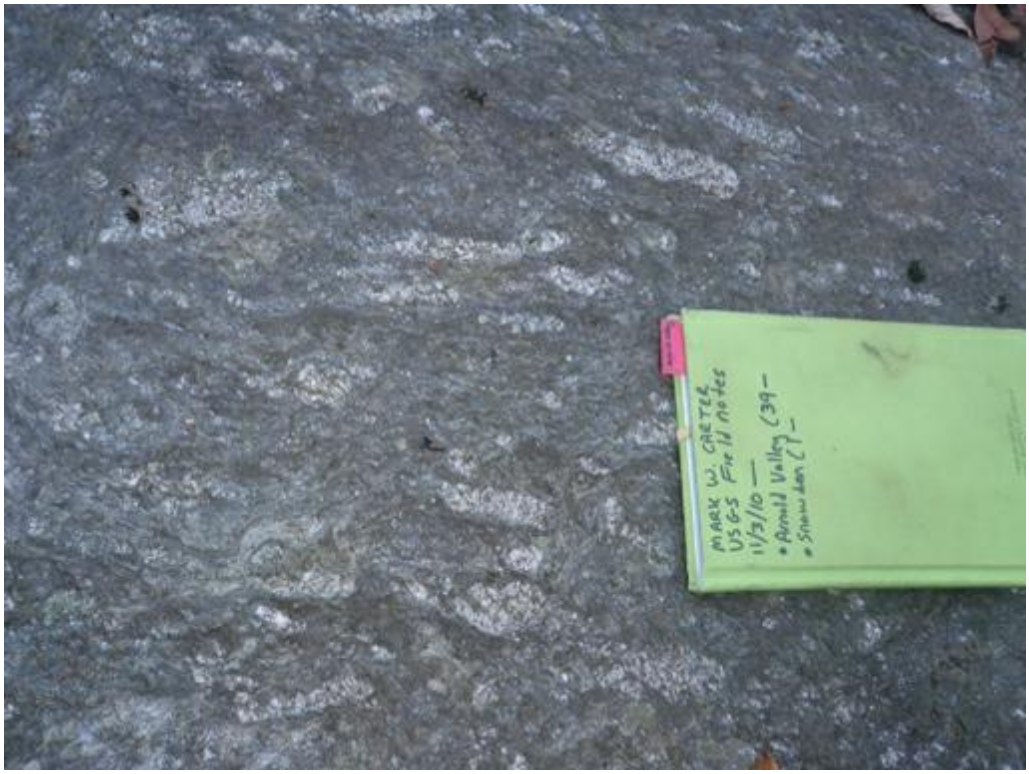
SN-188

View of Thunder Ridge. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-194

Blue quartz-bearing very coarse-grained mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-197



Very coarse-grained mylonite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

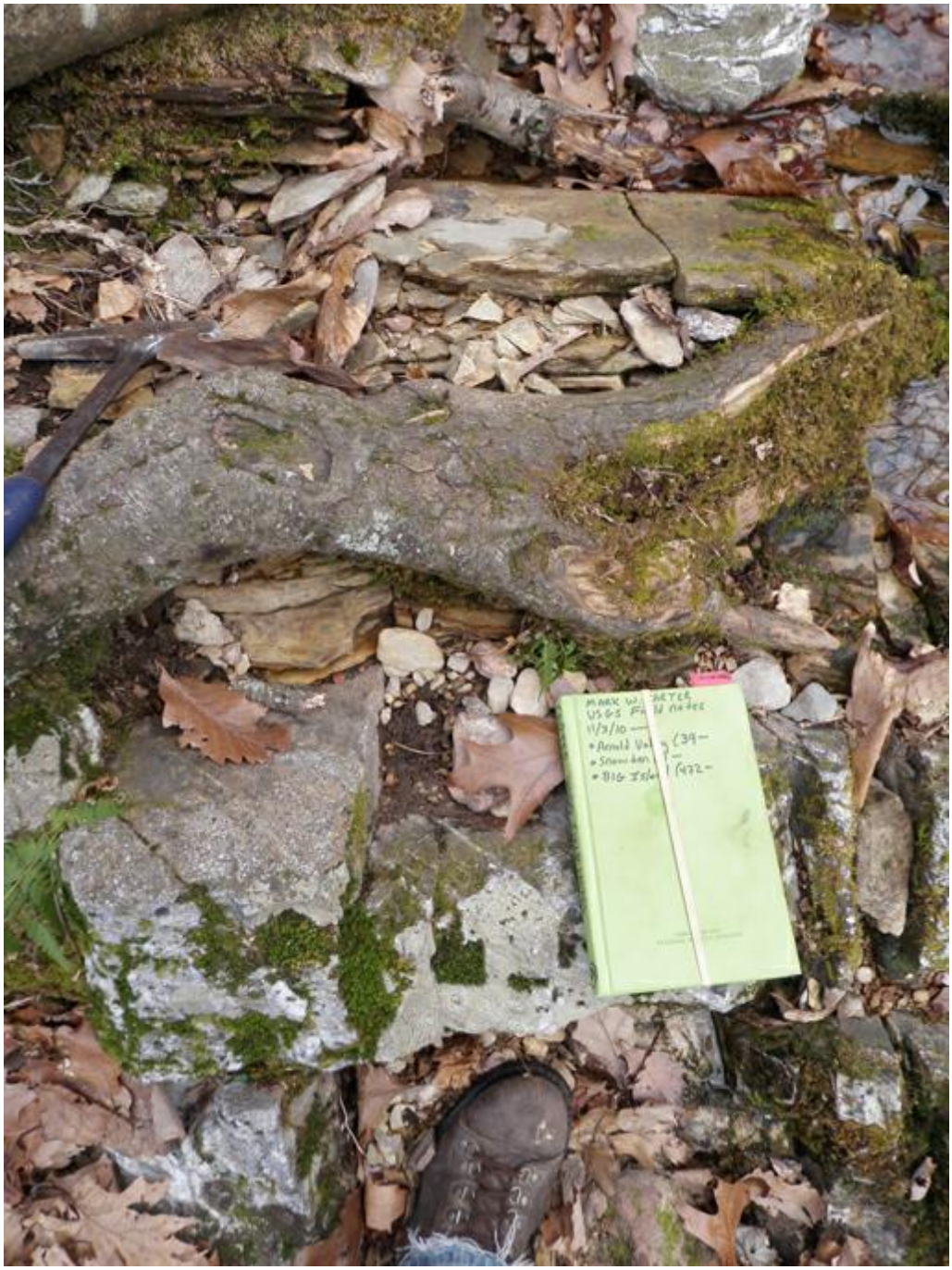
SN-249

View. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-263

View of Bluff Mountain. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-272



Bedding. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-279

Layering in quartz-feldspar leucogranitoid gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-442

Colluvial debris flows. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-504

Garnetiferous leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-526

Banded sandstone with crenulation cleavage. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039)*

SN-528

Bedding-cleavage relationships. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-529

Bedded sandstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-538

Conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-539

No Business Knob. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-546

Topographic surface. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-547

Tension gashes. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-569

Pavement outcrop of basement. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-587

Colluvial debris. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

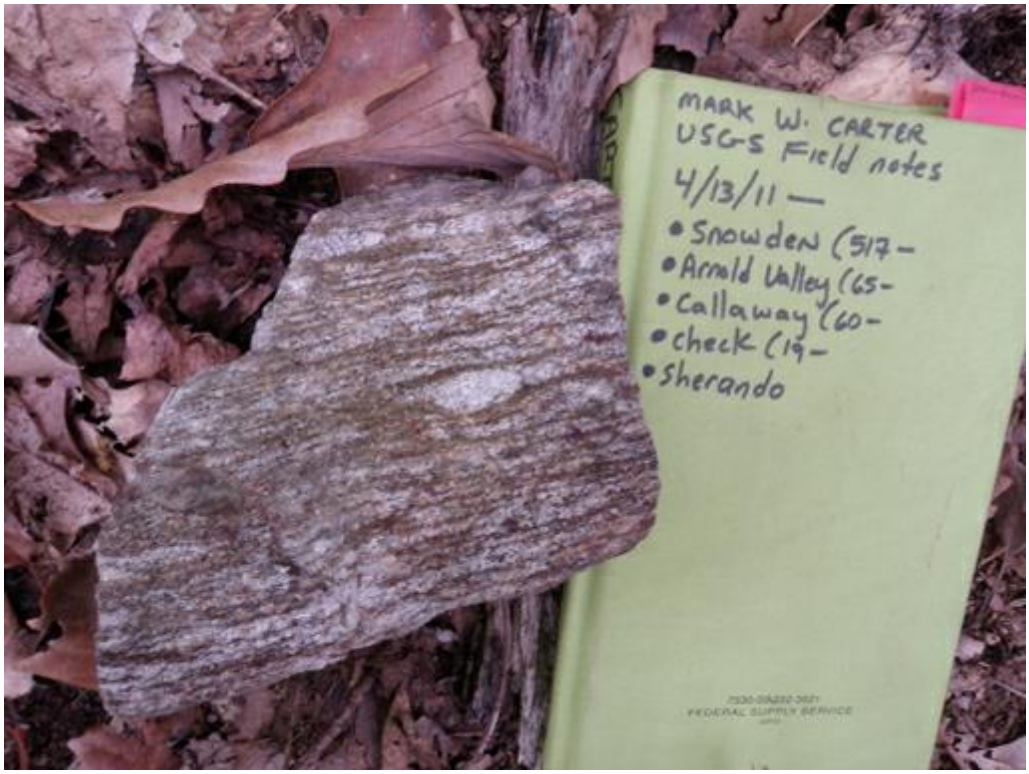
SN-626

View toward Wildcat Ridge. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-641

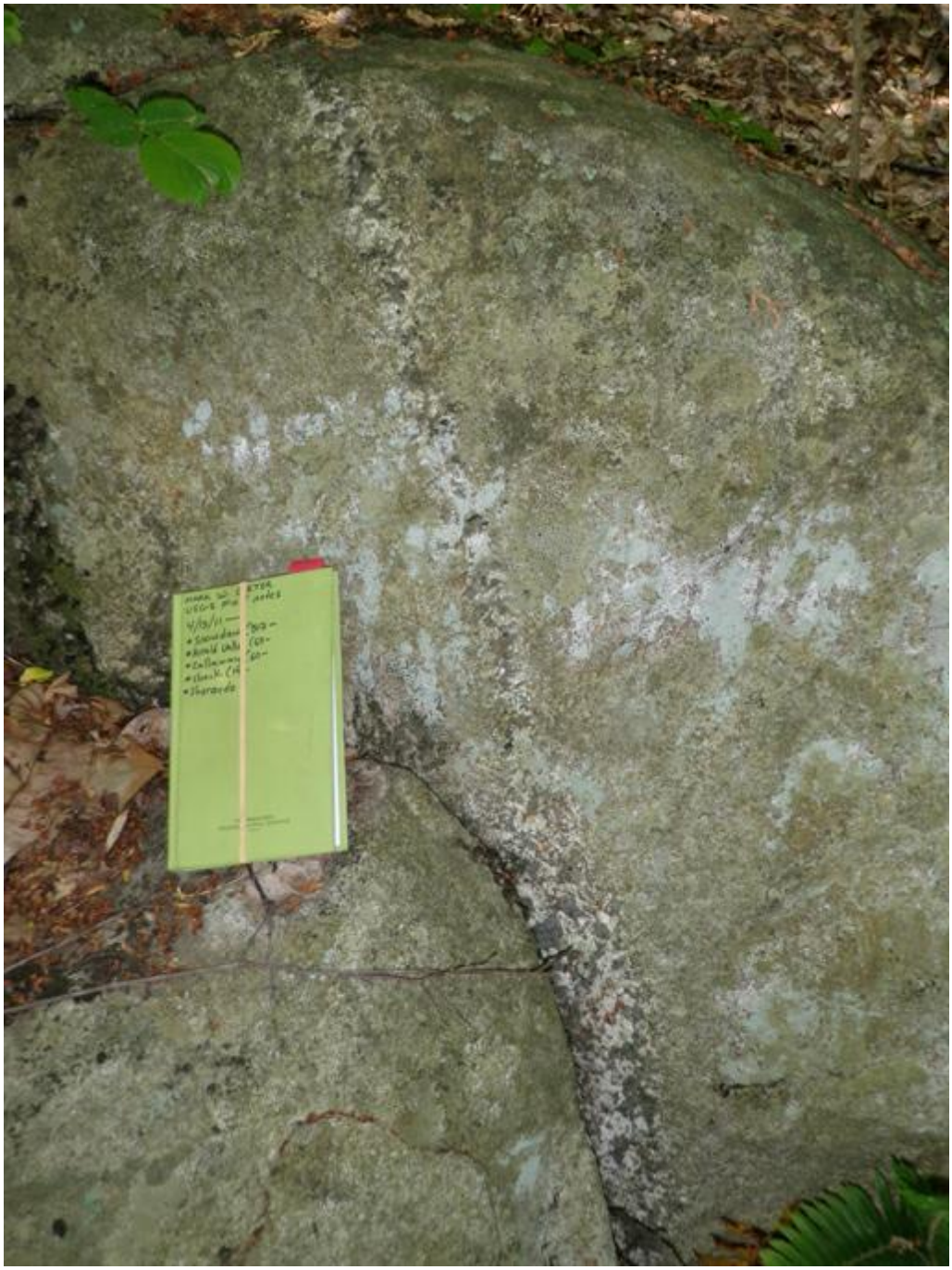
Blue quartz-feldspar dike. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-646



Augen within layering. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-653

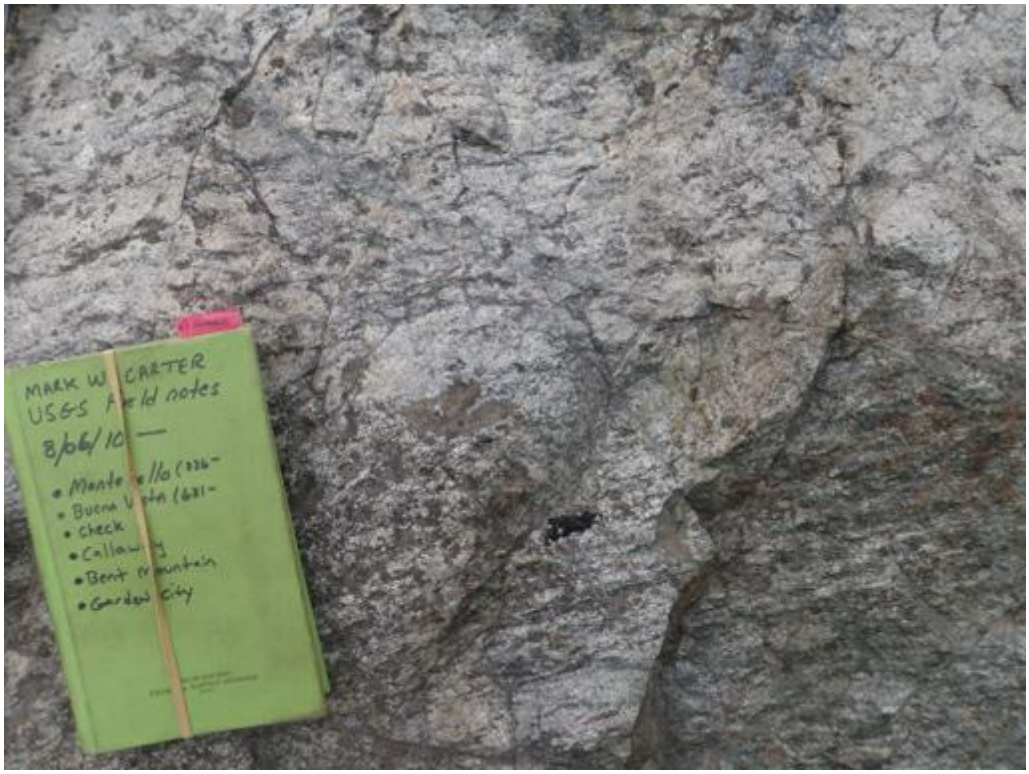


Blue quartz-feldspar dike. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SN-658

Garnetiferous gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SV-8



Contact between felsic gneiss xenolith and granodioritic charnockite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SV-40

Garnet porphyroblast in granulite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SV-47

Psuedotachyite basement in hanging wall of Blue Ridge fault. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

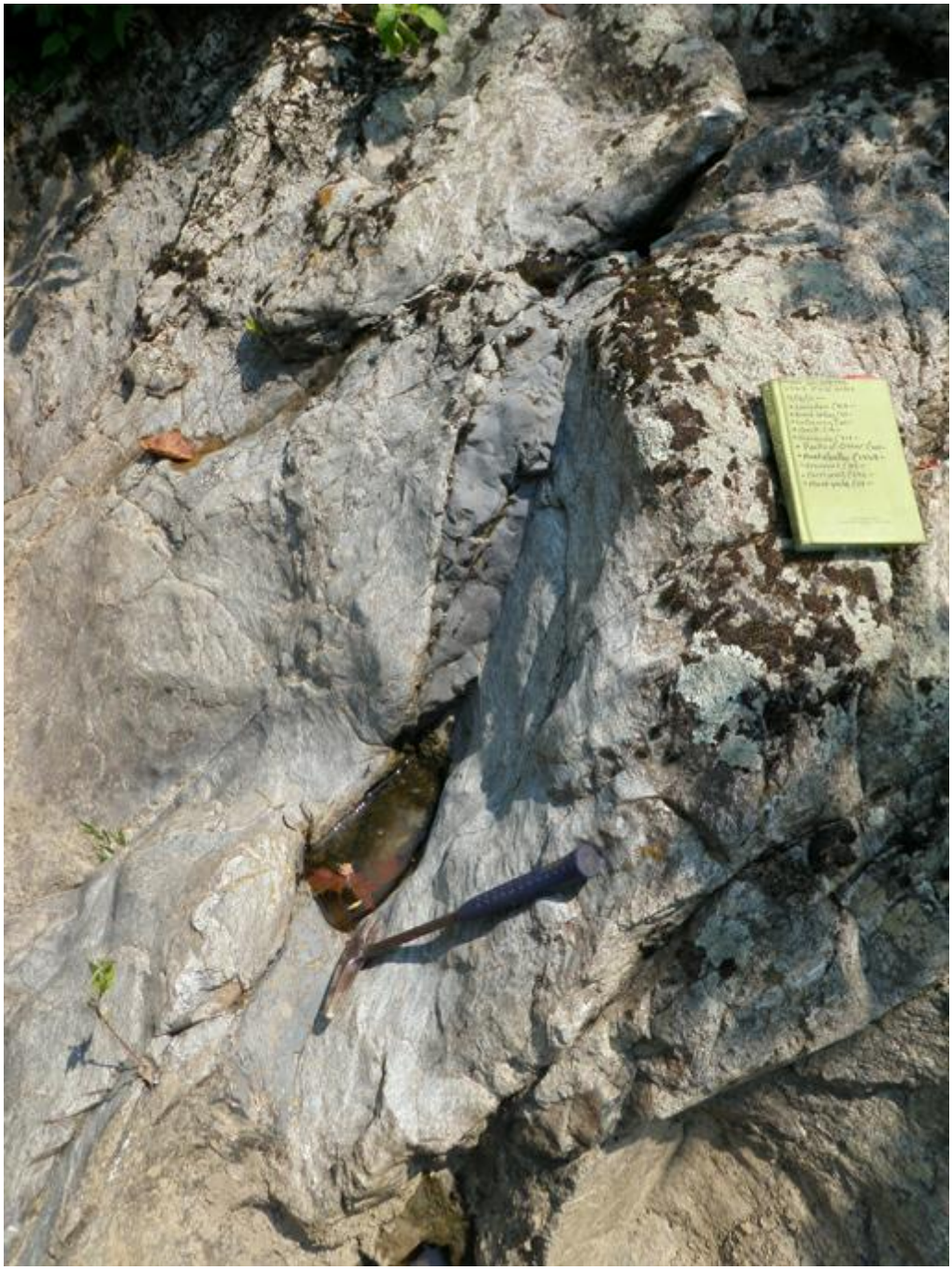
SV-48

Fault and spaced cleavage in footwall of Blue Ridge fault. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SV-67

Banded carbonate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SV-90



Metabasalt cross-cutting mesocratic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SV-91

Aplite cross-cutting mesocratic granitoid. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

SV-129

Porphyroblastic garnet leucogneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

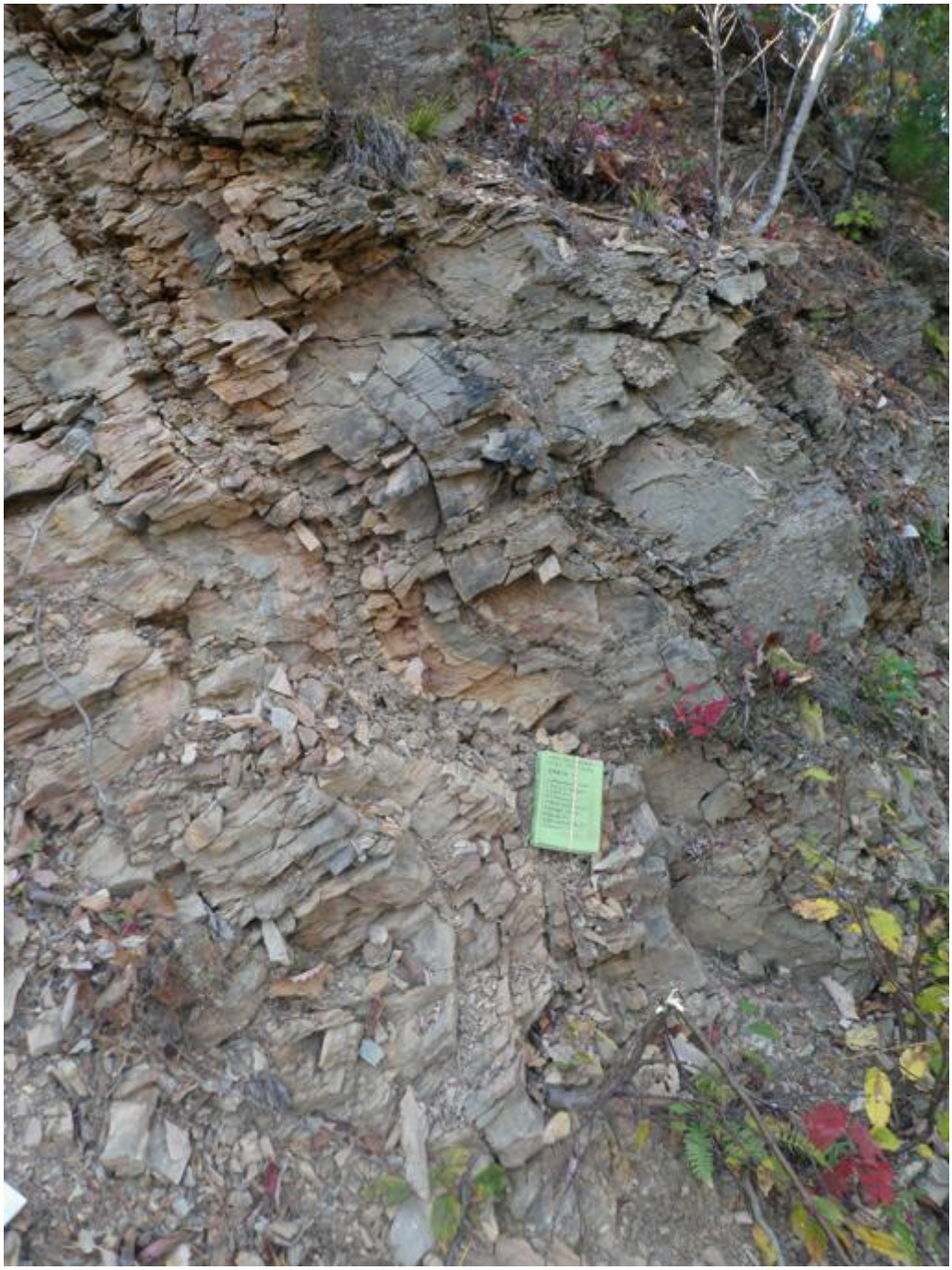
VM-32

F1 fold. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-44

F2 fold. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-45

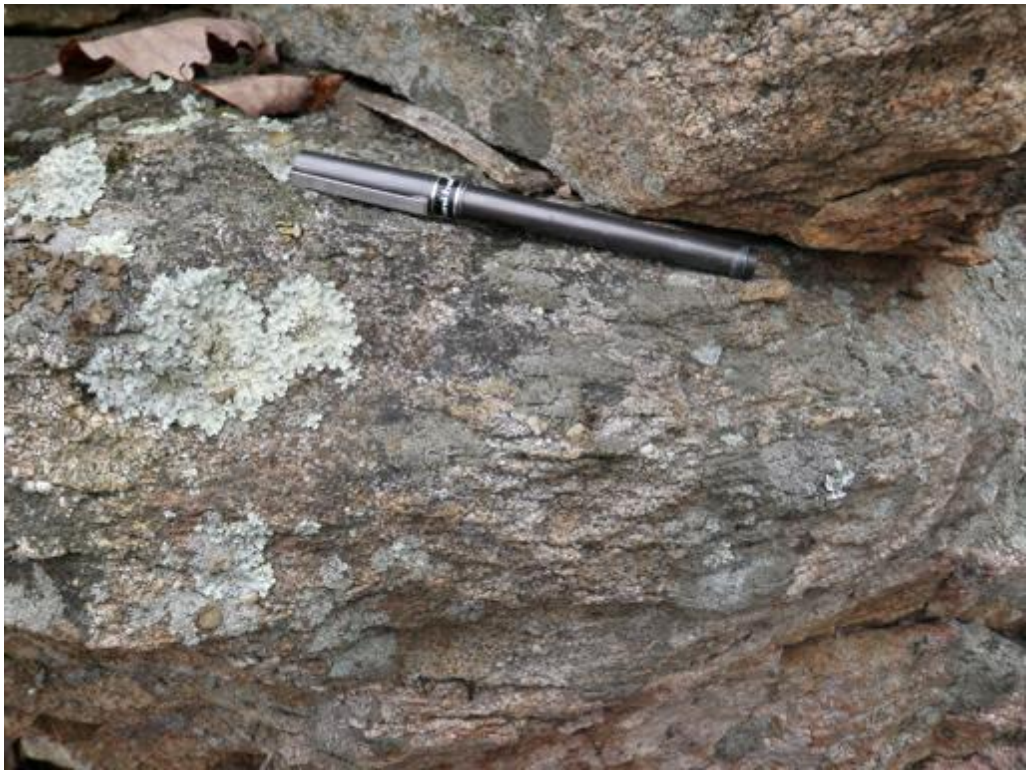


F1 folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-51

Pre-F1 fold. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-59

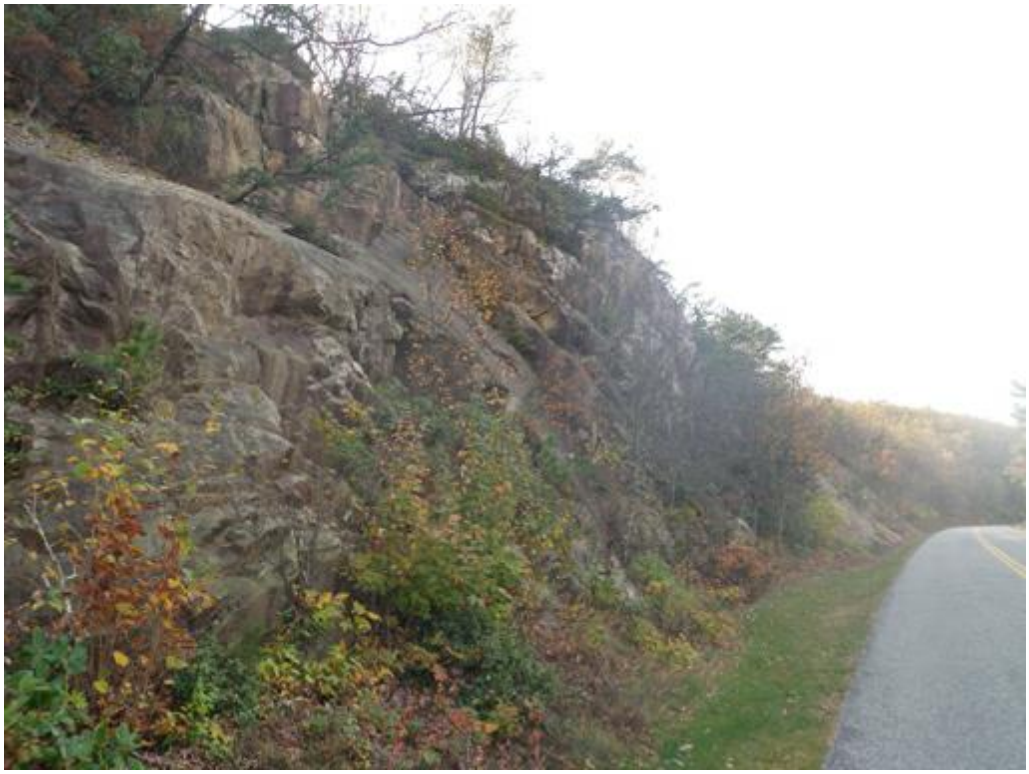


Cleavage in pebbly quartzite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-61

View. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-73

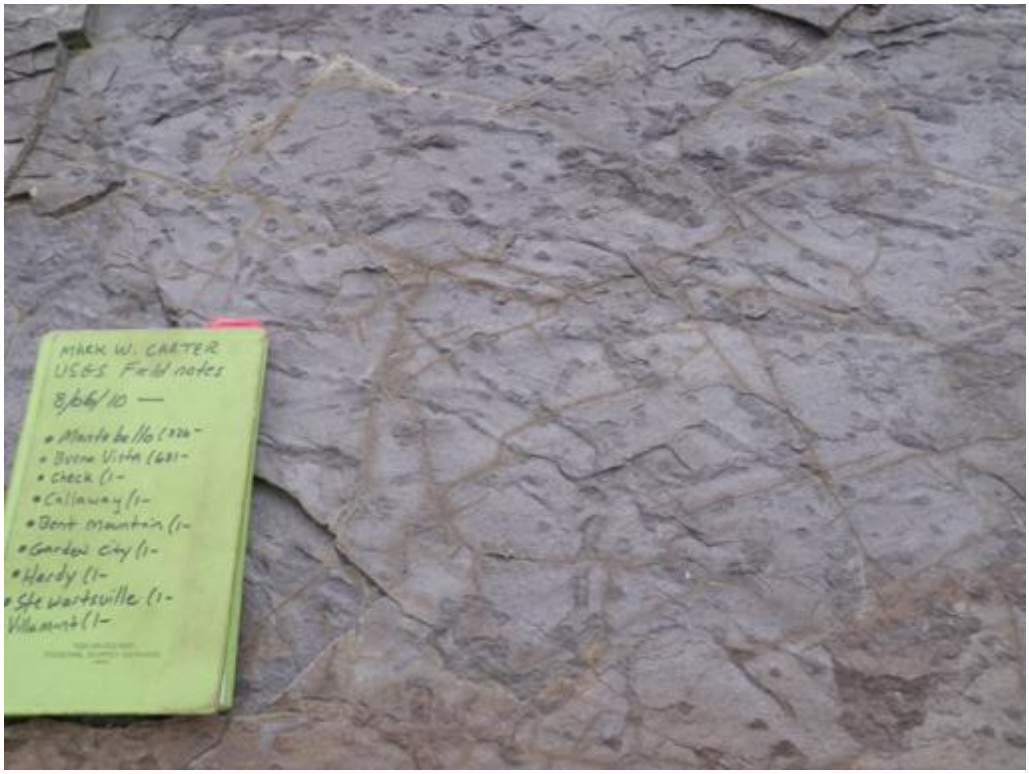


F1 fold at Unicoi-Hampton contact. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-85

Cut slope. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-86



Bioturbated sandstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-88

View towards Montvale and US 0. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-119

Skolithos. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-127

Skolithos. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-137

Contact between quartzite and siltstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-140

Iron workings. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-145

Black banded slate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-161

Iron workings. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VM-183

Slate chips or psuedotachyte. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

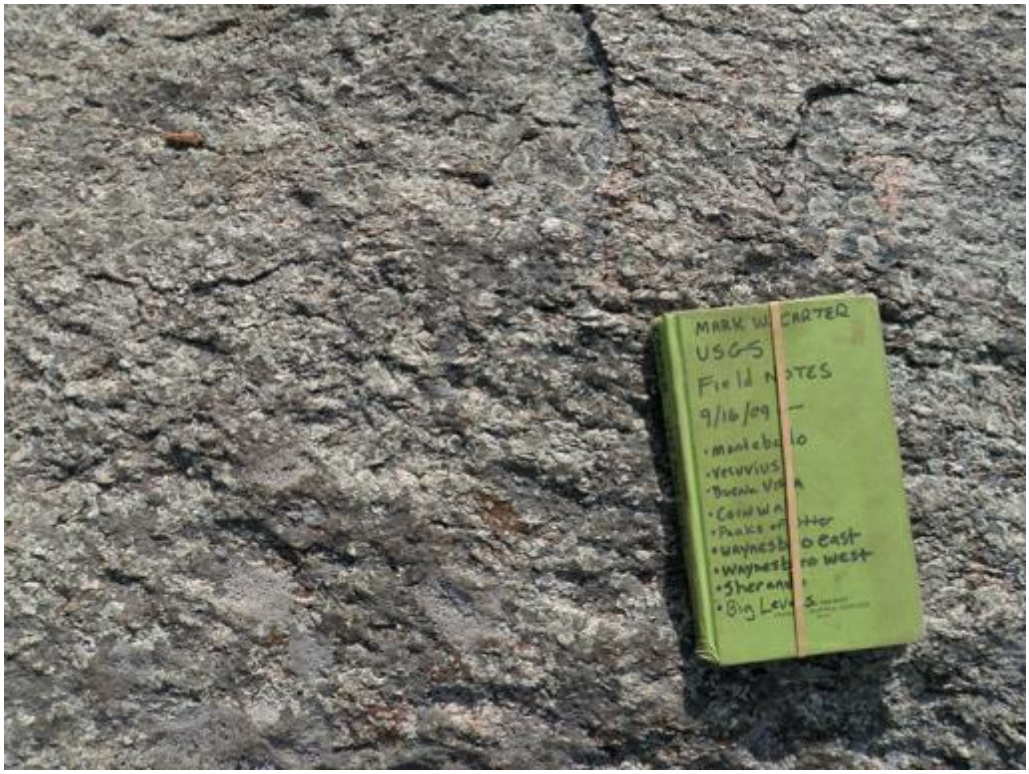
VS-20

Boulder conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VS-31

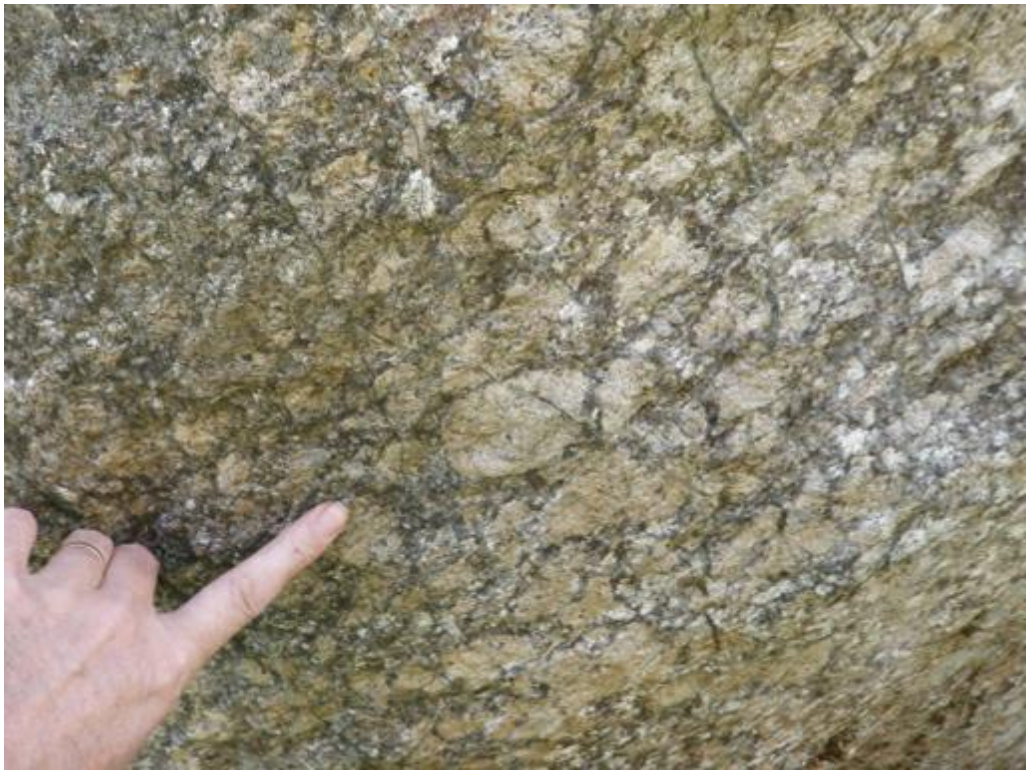
View. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VS-43



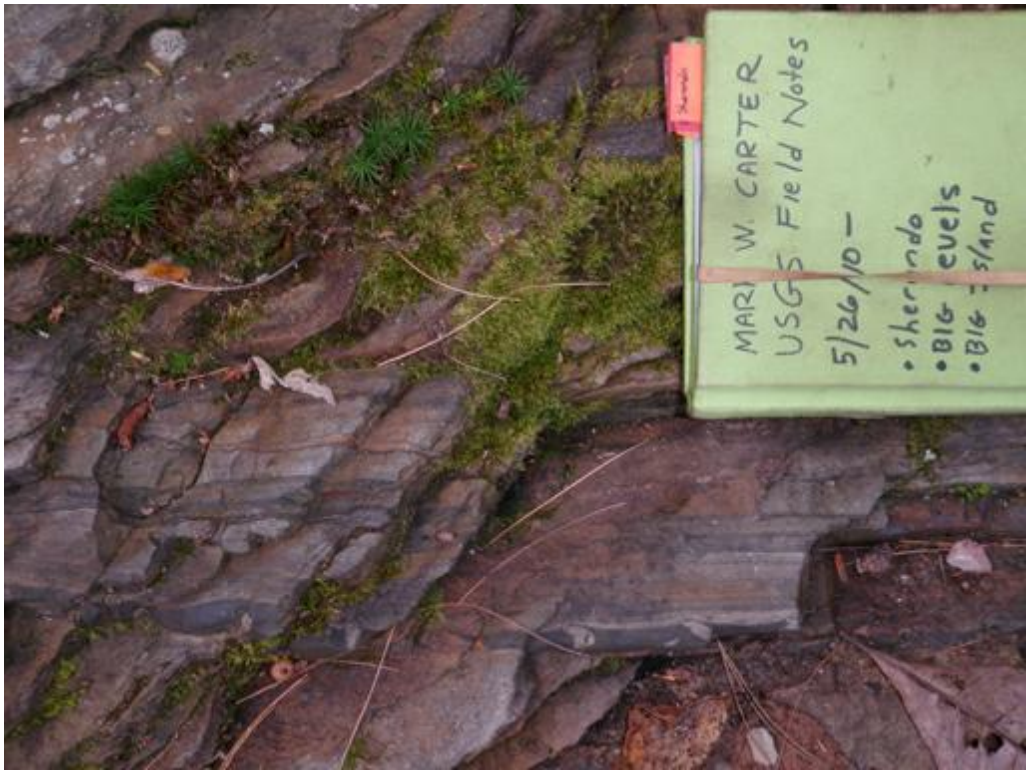
Paleozoic foliation. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VS-48



Megaporphyroclasts. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VS-67



Banded sandstone and black mudstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VS-69

Iron-cemented breccia. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VS-101

Breccia zone between conglomerate and greenstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VS-107

Fold at conglomerate-greenstone contact. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VS-155

Purple banded siltstone and sandstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

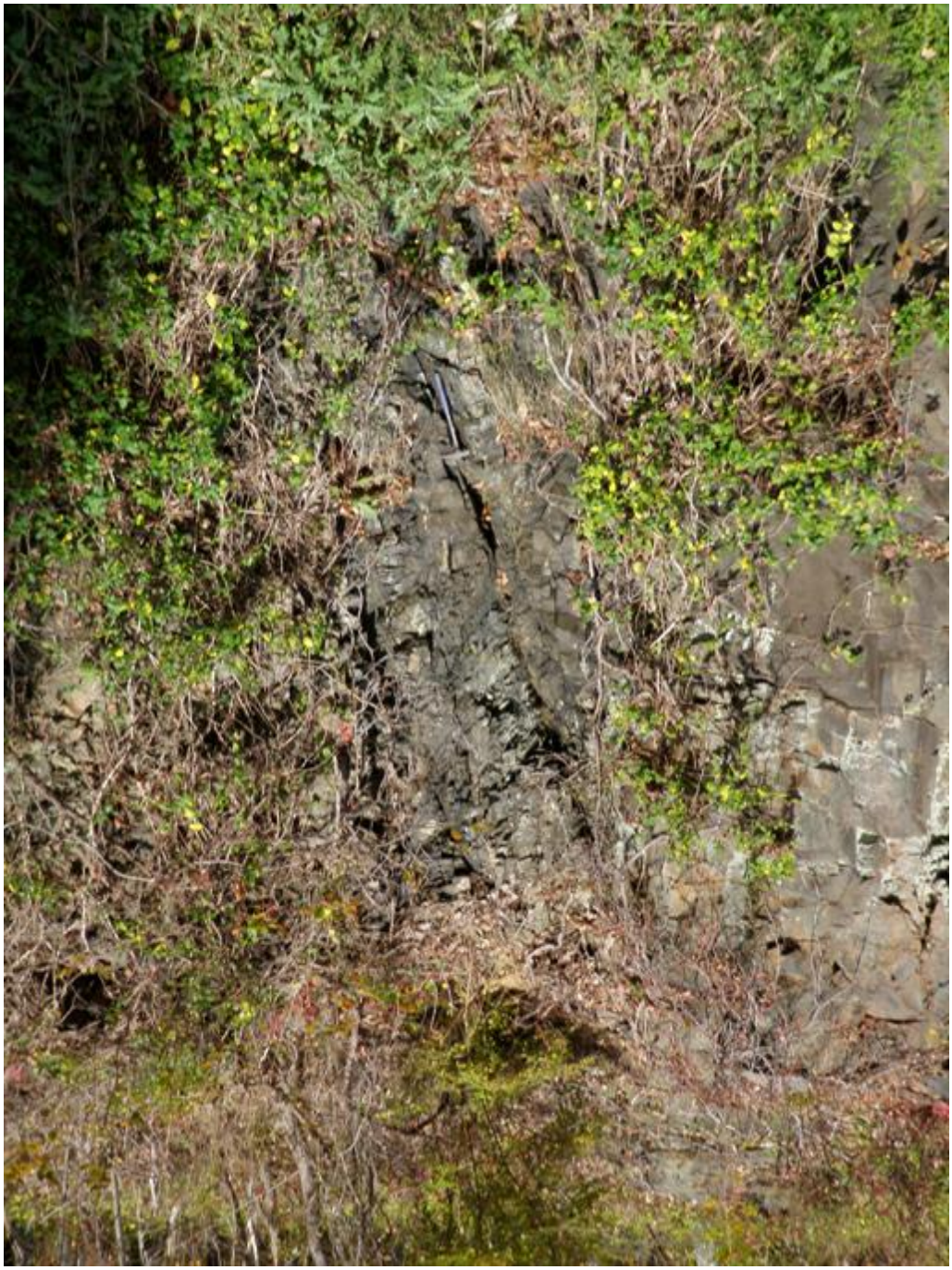
VS-158

Purple banded conglomeratic graywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

VS-204

Folds in purple siltstone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WE-3



Brittle fault in Catoctin. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WE-10

F2 folds in Catoctin. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WE-13

Lineated amygdules in Catoctin. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-1

Crenulations. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-6

Conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-13

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-54

Br plateau. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

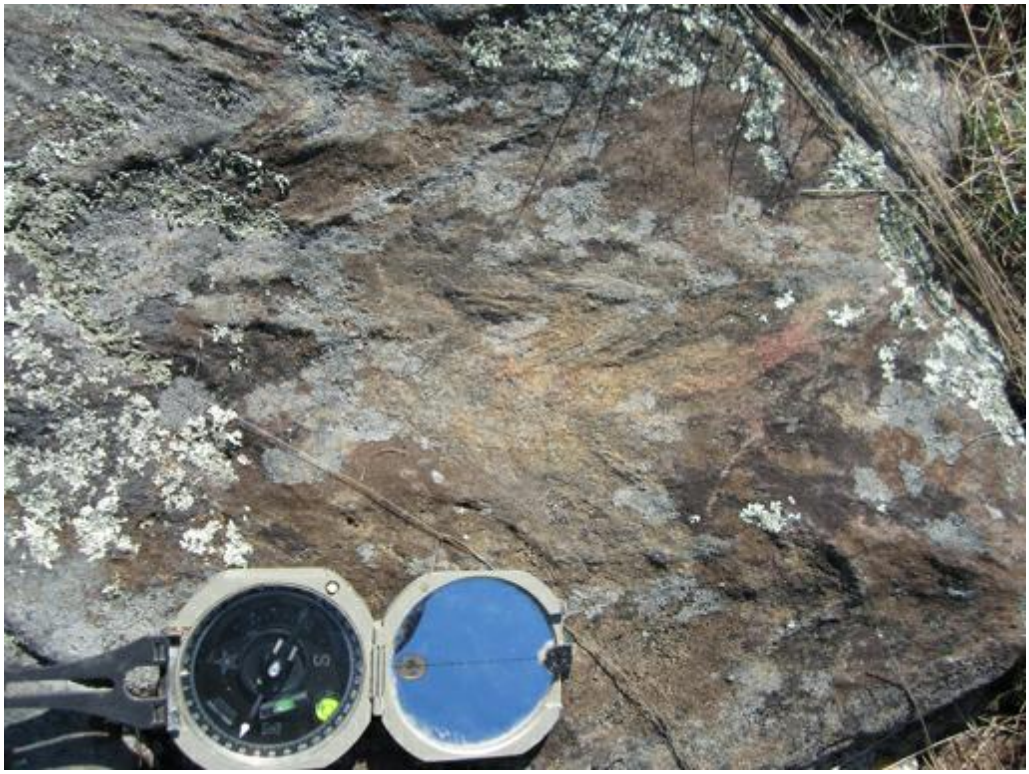
WL-73

Lineation. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-75

View. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-76



Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-78

Possible bedding. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-82

View to east. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-85

Fold. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

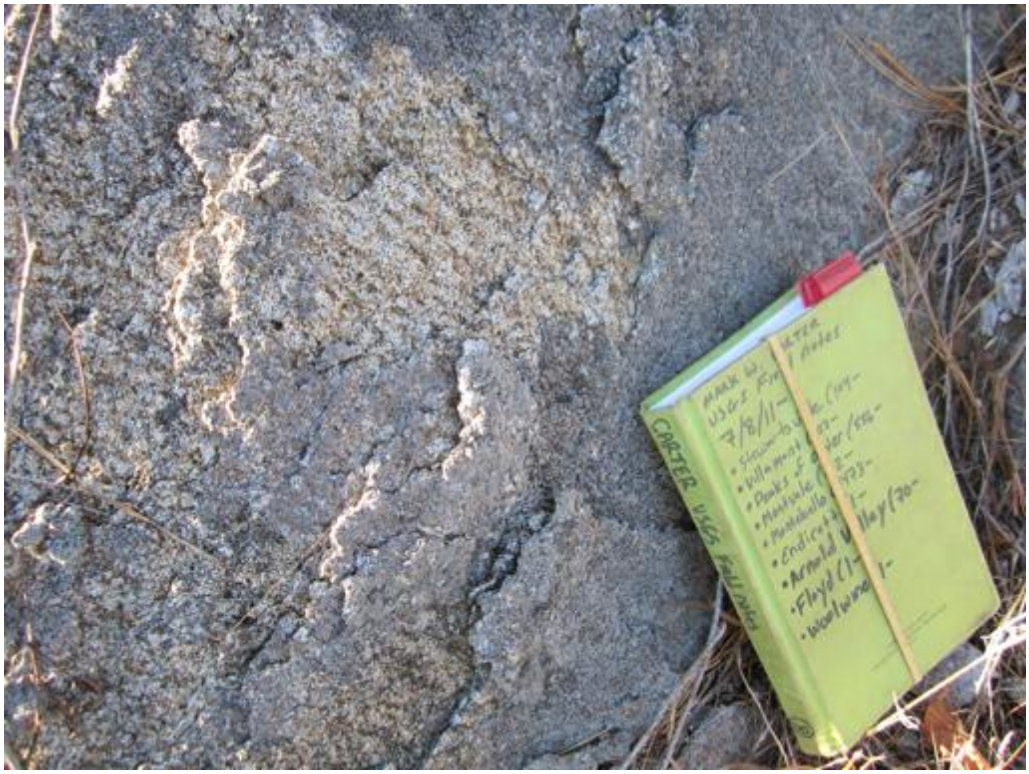
WL-86

Cleavage mullions. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-112

View to northeast. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-113



Lineation 1. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-115

Pebbles. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-116

Conglomerate. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-126

Fissile and extremely lineated amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-567

Lineated graphite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-598

Marble outcrop. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-600

Extremely deformed muscovite-biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-602

F2 fold in amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-683

Pin-striped metagraywacke with isoclinal folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-684

F2 folds in graywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-685

F2 folds in graywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-703

Sinistral fold sense. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-708

View to northeast. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-711

Dextral fold sense. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

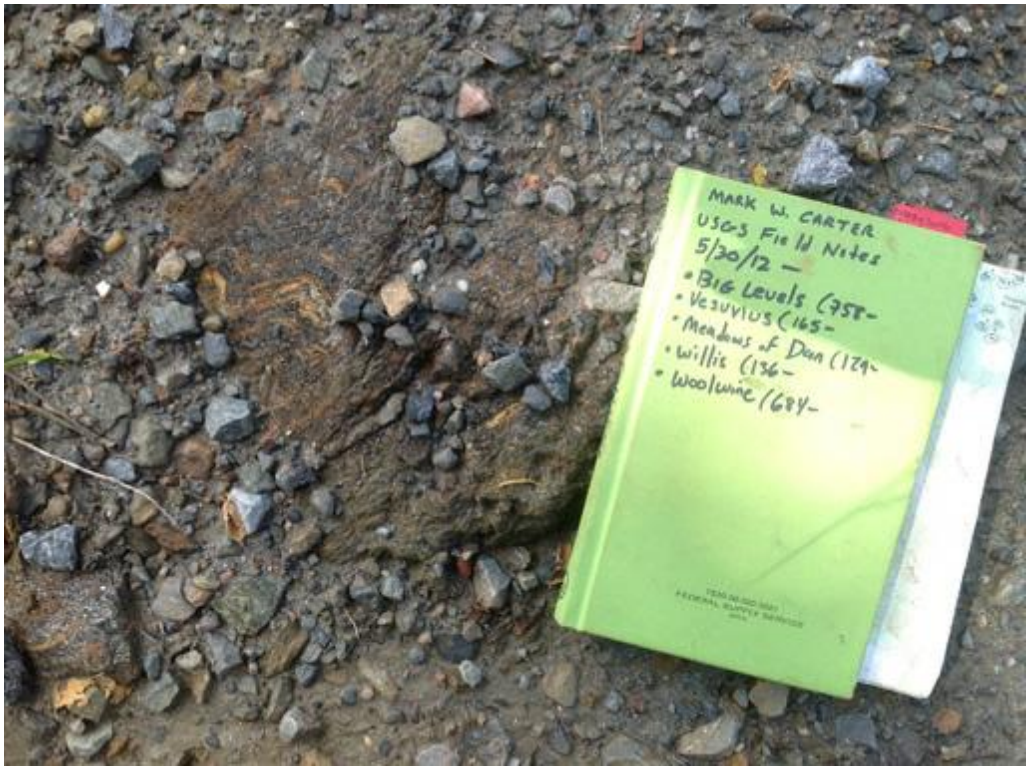
WL-716

Dextral fold sense. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-720

Folds in layered graywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-722



Folds in layered graywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-740

Folds in layered graywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-744

Sinistral fold sense. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-747

Graywacke with folded quartz vein. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

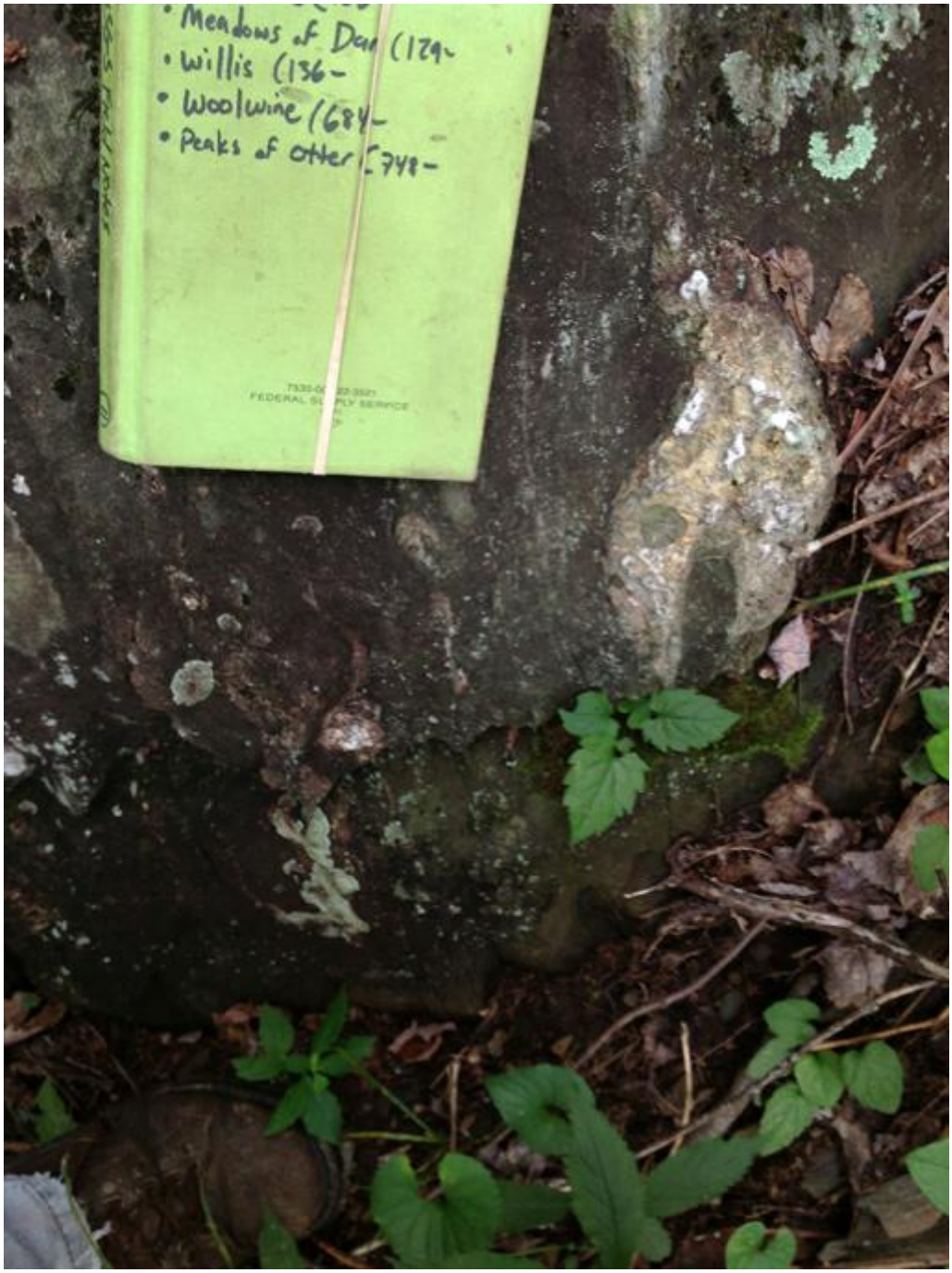
WL-782

Extremely foliated mica gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-783

Sinistral fold sense. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-817



Quartz stringer isoclines in amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-823

Structures. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

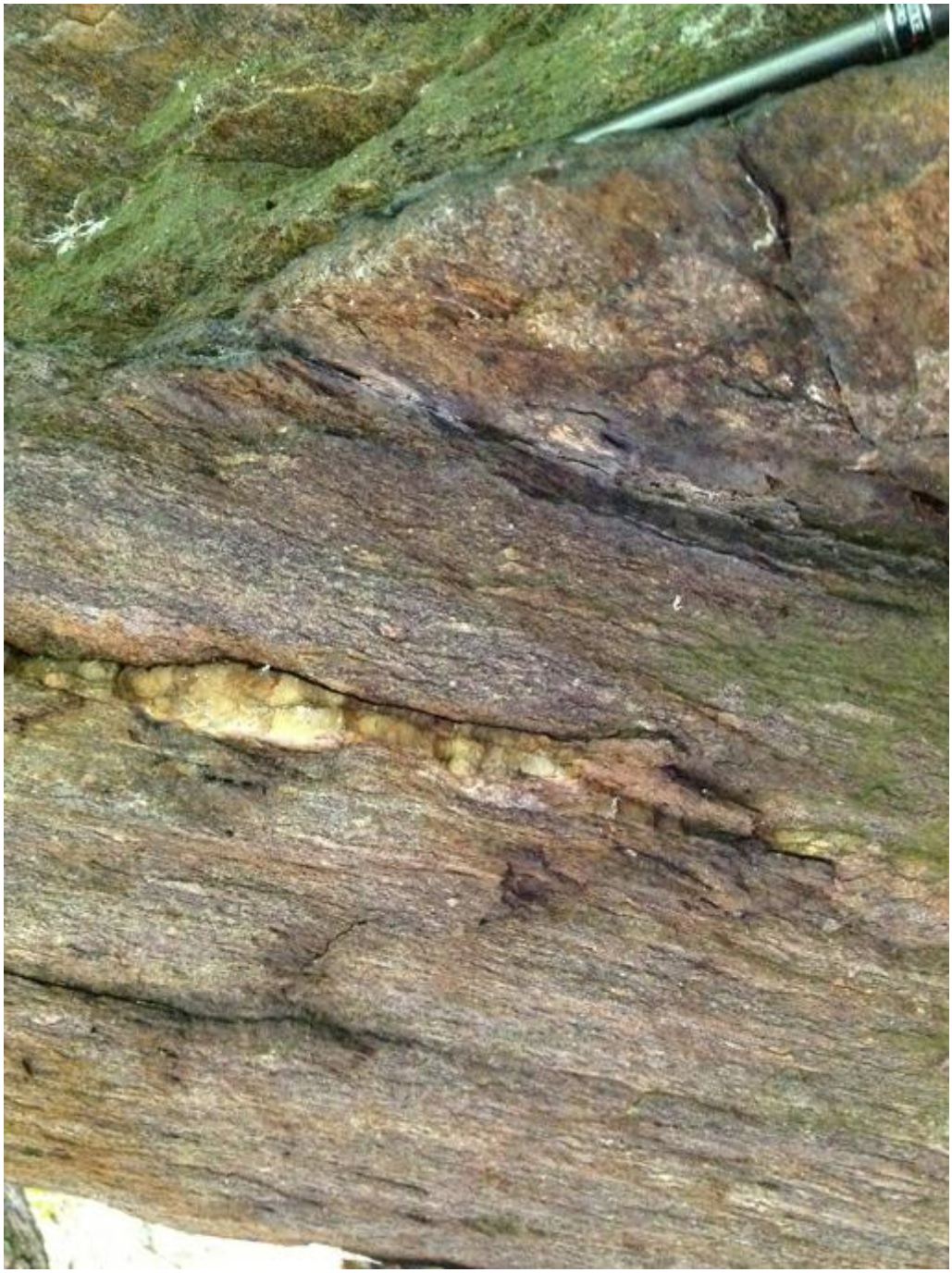
WL-826

Structures. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-830

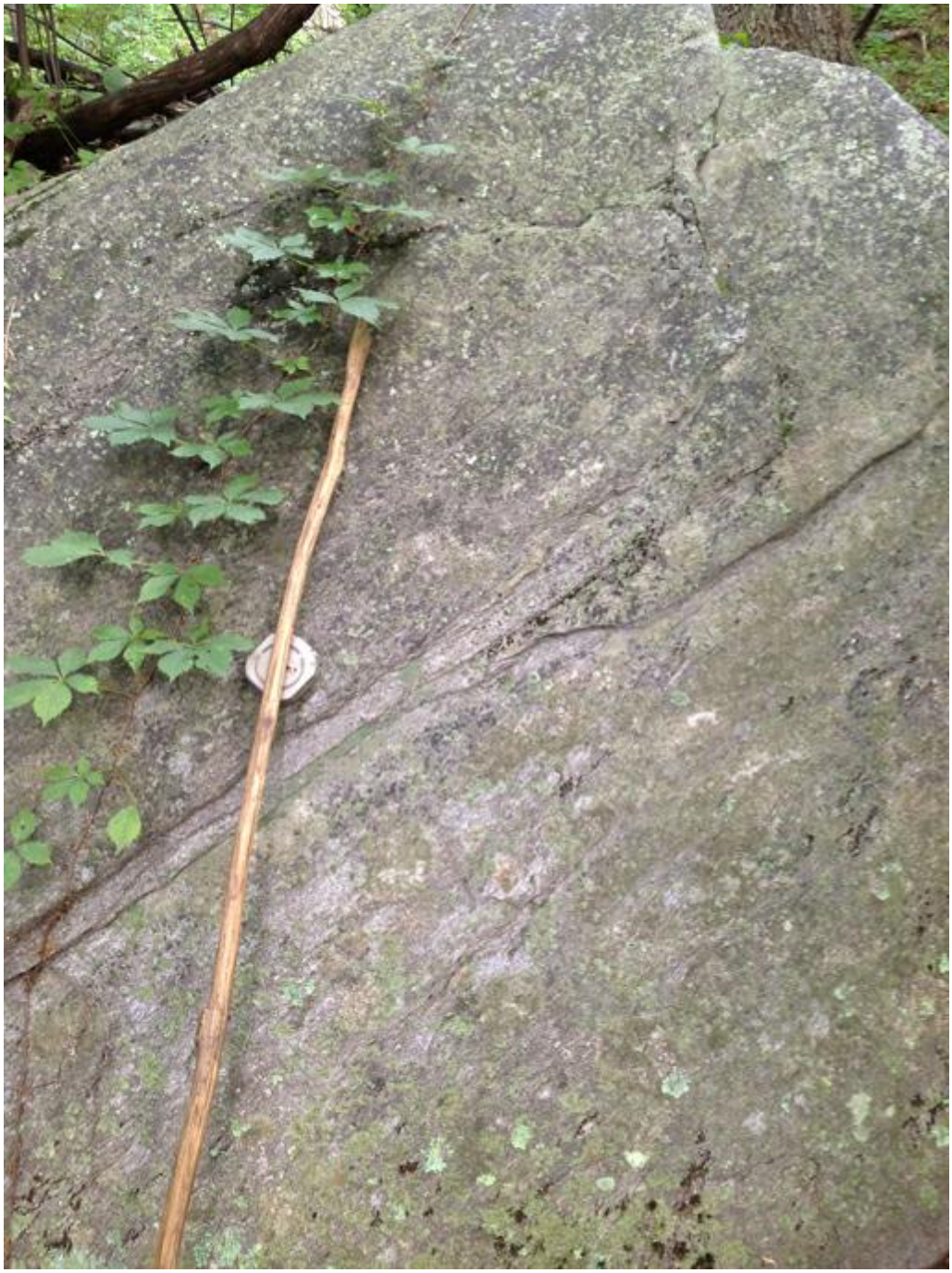
Coarse-grained ampphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-834



Extremely deformed metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-835



Extremely deformed metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-863

Intersection lineation. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-864

Brecciated quartz and amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-865

Sheared quartz vein. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-866

Acicular needles of amphibole overprinting lineation. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

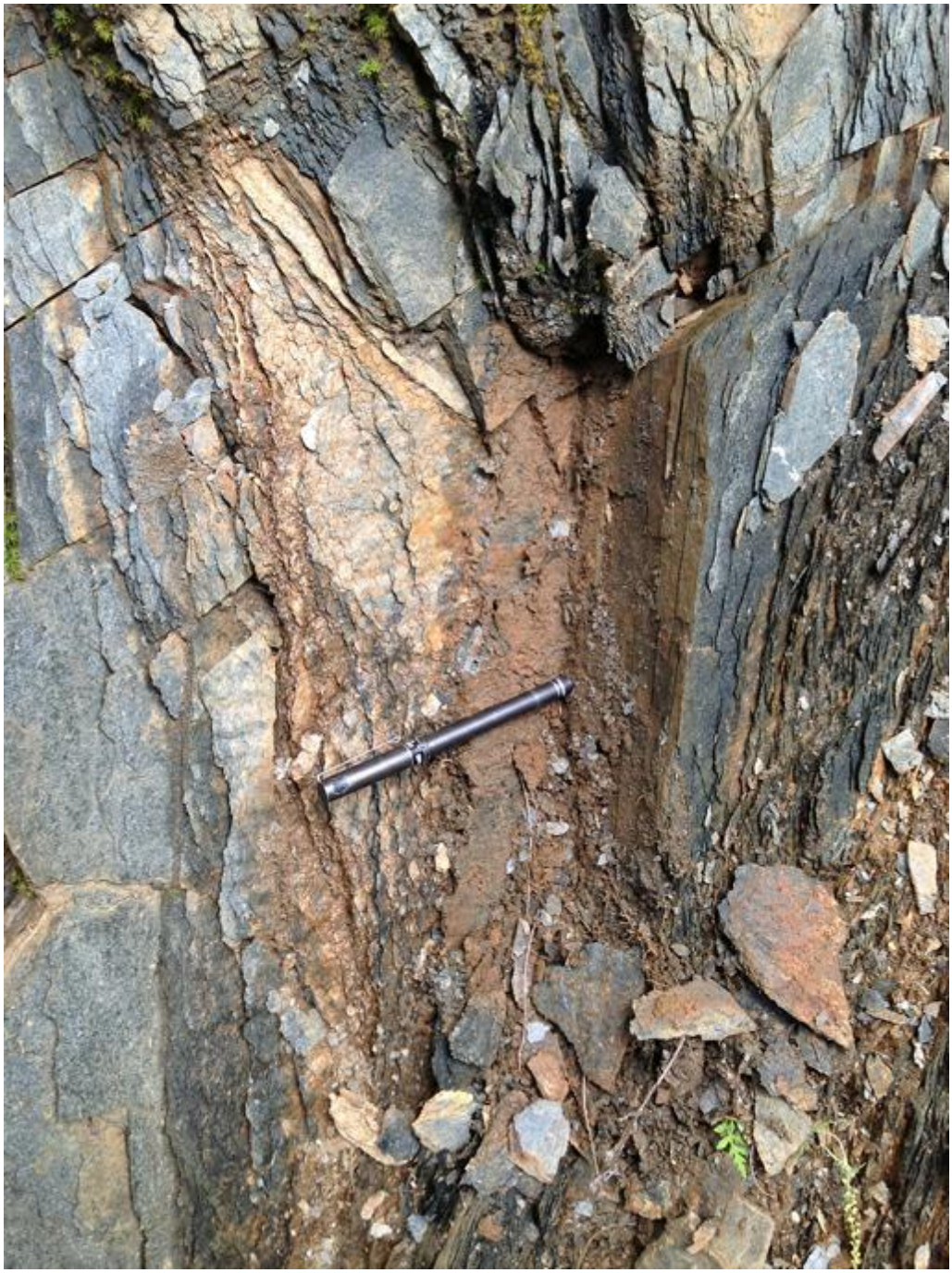
WL-874

Extremely deformed metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-888

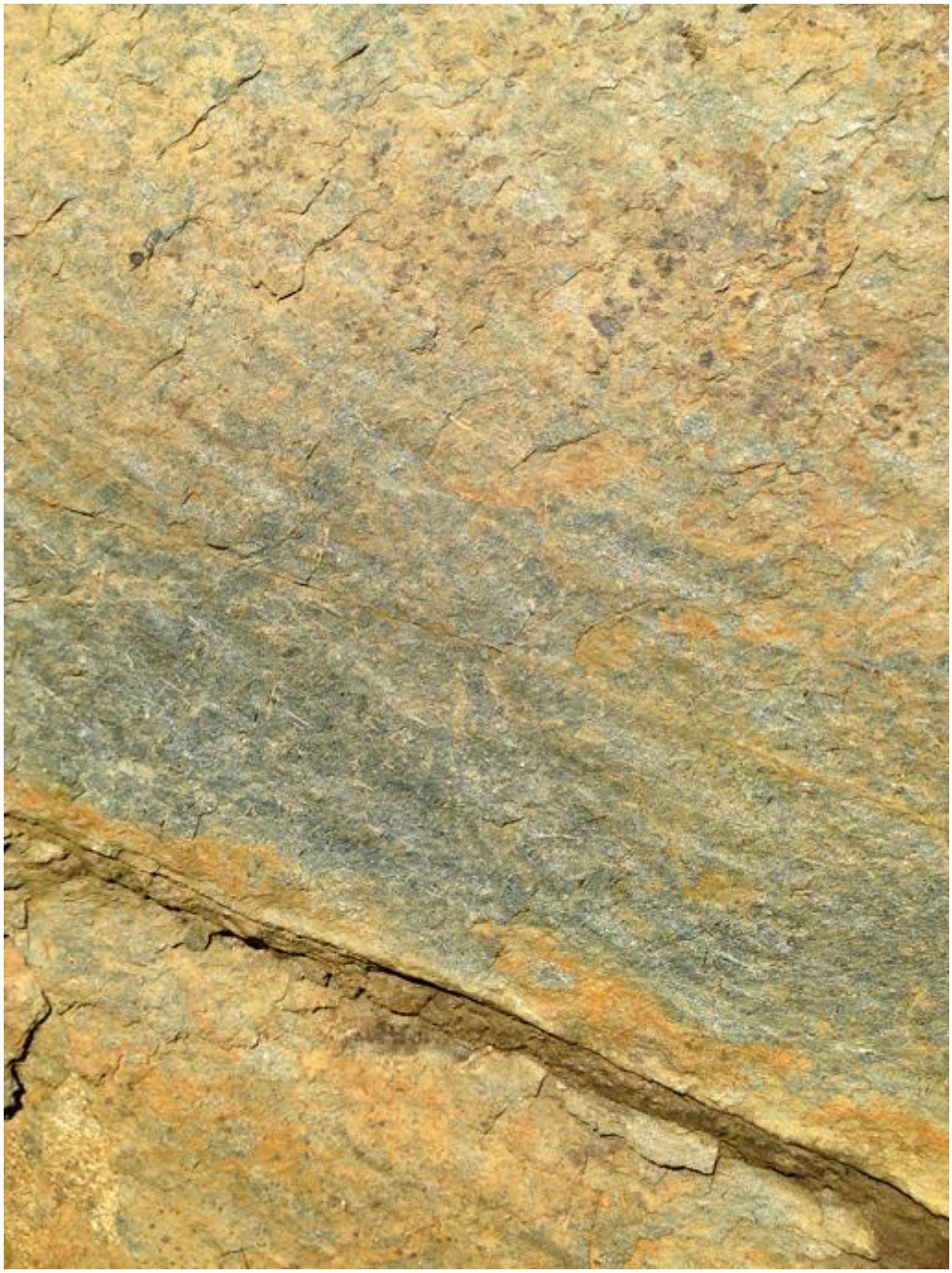
Fold axis in amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-892



S3 crenulations. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-893



S3 crenulations. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-907

F2 isocline in quartz-layered amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-912

F2 fold in amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-933

View. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-959

Cross-cutting breccia zone. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-967

Isoclinal fold in quartz-layered amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-971

Quartz-layered amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-984

Well-lineated biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-989

Garnet-mica schist. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WL-993

Quartz-layered amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-9

Folds. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-10

Layering in amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

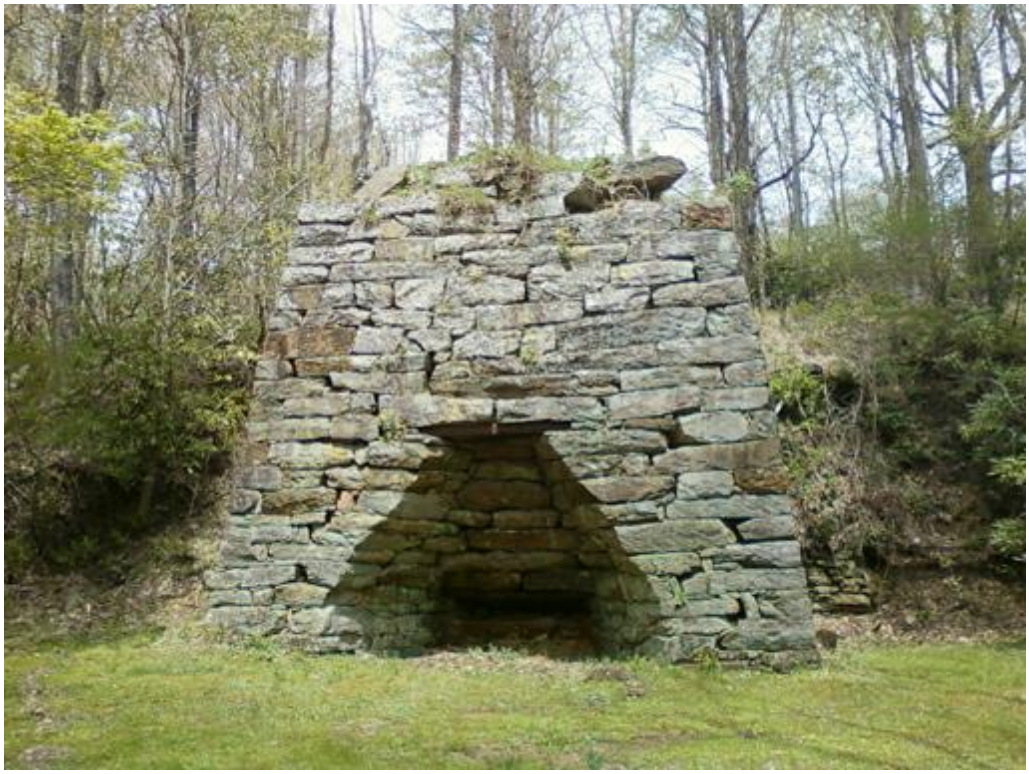
WS-29

S1 folds in metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-57

Composite layering and folds in metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-67



Toncrea iron furnace. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-88

Extremely foliated muscovite-biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

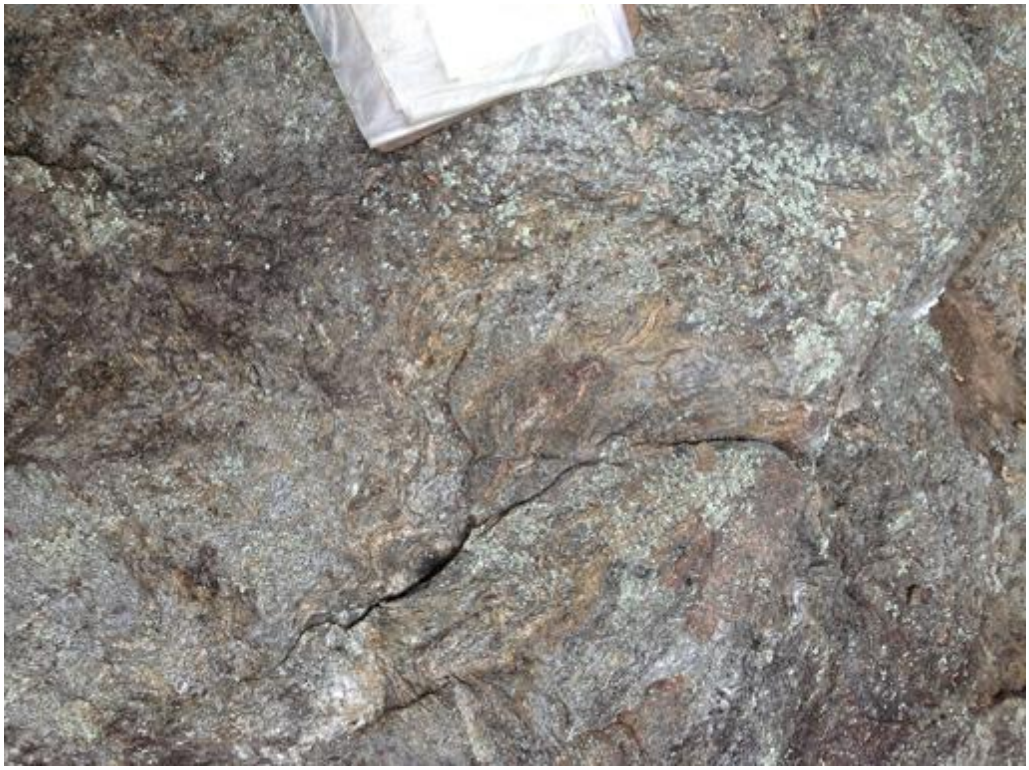
WS-98

Folded muscovite-biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-100

Folded muscovite-biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-102



Folded muscovite-biotite gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-143

Terrace and floodplain. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-144

F3 fold in amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-160

F2 folds in amphibolite. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-260

Folded metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-291

Contact between amphibolite and mica gneiss. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-294

Two foliations in mica gneiss with biotite porphyroblasts. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-398

Pebbles in metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-400

Pebbles in metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-403

Pebbles in metagraywacke. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-432

BLRI building stone quarry. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

WS-465

Toncrae mine. *Extracted from:* (Blue Ridge Parkway Bedrock North) (*GRI Source Map ID 76039).*

GRI Source Ancillary Map Information

Blue Ridge Parkway Bedrock North

Carter, Mark, Crider, Allen, and Southworth, Scott, 2015, Geologic Map of the Virginia portion of Blue Ridge Parkway, Virginia: U.S. Geological Survey, unpublished SIM--xxxx; scale 1:100,000 (*GRI Source Map ID 76039*).

The following information was provided with the source digital data.

Readme (Source Data)

Field work and compilation by Mark Carter
GIS database by E. Allen Crider Jr.

All data is in Universal Transverse Mercator grid, Zone 17 North. North American Datum, 1937

This database is NCGMP09 compliant with some modifications. These modifications include additional fields in point feature classes, including MapDescription (used by the Author for the actual map description on a printed map); RockType (used by the author to describe the rock in the field). The DescriptionofMapUnits table contains modifications to the Description field, many descriptions for rock units exceeded the standard column width and therefore the width was modified. In addition, many of those descriptions contained multiple DataSourceIDs so a notes field was included for additional data sources in the DataSource table. The RepurposedSymbols table was not completed but more information about re-purposed symbols can be obtained on request.

File Structure

/Geodatabase(ArcGIS 10.X)/ (Each feature class contains its own metadata)
BlueRidgeParkway.gdb
ContactsandFault (the feature class contain no concealed contacts; but concealed contact do exist beneath water bodies)
DataSourcePolys
GenericPoints (Containing mine locations and age locations)
MapUnitPolys
OrientationPoints
PhotoPoints
Stations
DataSources (Table)
DescriptionOfMapUnits (Table)
Glossary (Table)

DescriptionOfMapUnits.xlsx
DataSources.xlsx

Photos for the PhotoPoints feature class are available in the Photo Folder

MapUnitPolys.lyr layer file is also available

Basemaps.lpk contains the layer package for base maps. Individual processed base maps are available

by request.

Readme.txt (this text file)

Summary Information

The U.S. Geological Survey, in cooperation with the National Park Service, conducted detailed geologic mapping on 35 7.5-minute quadrangles, within a 2-mile-wide+ corridor centered on the Parkway, from BLRI (Blue Ridge Parkway) Mile Post (MP) 0 near Afton, Virginia southward to MP 218 at Cumberland Knob, approximately 1.3 km south of the Virginia – North Carolina State Line. Detailed bedrock geologic mapping for this project was conducted at 1:24,000-scale: Station point geologic data (lithology, structural measurements, mineral resource information, and other important geologic observations) were used to identify major map units, construct contact lines between map units, identify the nature of those contacts, determine contact convention control, trace structural elements across the project area, and determine fault orientation and kinematics. Station point geologic data, contacts and faults from previous work in the BLRI corridor were also evaluated for compilation and synthesis in the BLRI mapping project. The BLRI cuts at an oblique angle nearly the entire width of the Blue Ridge Geologic Province in Virginia. Thus, the geology varies significantly along it's along its 216-mile traverse, from Mesoproterozoic "basement" and Neoproterozoic to Cambrian "cover" rocks in the core and western flank of the Blue Ridge anticlinorium in the northern section of the BLRI corridor, to Neoproterozoic to early Paleozoic metamorphosed sedimentary rocks in imbricated thrust sheets of the eastern Blue Ridge south of Roanoke. At Roanoke, the BLRI traverses a section of the Valley and Ridge geologic province. Within this framework, sixty bedrock map units were defined within the BLRI corridor in Virginia.

Description

The U.S. Geological Survey, in cooperation with the National Park Service, mapped 35 7.5-minute quadrangles, within a 2-mile-wide+ corridor centered on the Parkway, from BLRI (Blue Ridge Parkway) Mile Post (MP) 0 near Afton, Virginia southward to MP 218 at Cumberland Knob, approximately 1.3 km south of the Virginia – North Carolina State Line.

Detailed bedrock geologic mapping for this project was conducted at 1:24,000-scale by systematically traversing roads, trails, creeks, and ridges within and adjacent to the 2-mile-wide+ corridor along the 216.9-mile length of the BLRI in Virginia. Geologic data at more than 23,000 station points were collected during this project (September 2009 – February 2014), with approximately 19,500 included in the accompanying database. Station point geologic data collected included lithology, structural measurements (bedding, foliations, folds, lineations, etc), mineral resource information, and other important geologic observations. Station points at the start of this project (September 2009) were located in the field using topographic reckoning; after May 2012 stations were located using Topo Maps (latest version 1.12.1) for Apple IPad 2, model MC744LL/A. Since the start of the project, station point geologic data and locational metadata were recorded both in analog (field notebook and topographic field sheets) and digitally in ESRI ArcGIS (latest version ArcMAP 10.1).

Station point geologic data were used to identify major map units, construct contact lines between map

units, identify the nature of those contacts (igneous, stratigraphic or structural), determine contact convention control (exact – located in field to within 15 meters; approximate – located to within 60 meters; inferred – located greater than 60 meters), trace structural elements (faults, fold axes, etc) across the project area, and determine fault orientation and kinematics. Geologic line work was initially drafted in the field during the course of systematic detailed mapping; line editing occurred during office compilation in Adobe Illustrator (latest version CS 4). Final editing occurred during conversion and compilation of Illustrator line work into the ArcGIS database, where it was merged with station point geologic data.

Station point geologic data, contacts and faults from previous work in the BLRI corridor were evaluated for compilation and synthesis in the BLRI mapping project. Station point geologic data compiled from previous work are referenced and marked with a “C” in the database. Compiled line work is also clearly tagged and referenced.

The BLRI cuts at an oblique angle nearly the entire width of the Blue Ridge Geologic Province in Virginia. Thus, the geology varies significantly along its along its 216-mile traverse. North of Roanoke (BLRI MP 115), the Blue Ridge is defined as an orogen-scale, northwest-vergent, northeast-plunging reclined anticlinorium, and from its start at MP 0 near Afton, Virginia, southward to Roanoke, the BLRI traverses the western limb of this structure. Here, rocks range in age from Mesoproterozoic to Cambrian: Mesoproterozoic orthogneisses and metamorphosed granitoid rocks of the Shenandoah massif comprise “basement” to Neoproterozoic to Cambrian mildy- to non-metamorphosed to sedimentary “cover” rocks; the BLRI crisscrosses in many places the contact between cover and basement. Mesoproterozoic basement rocks in the Shenandoah massif represent the original crust of the Laurentian (ancestral North American) continent; sedimentary cover rocks were deposited directly on this crust during extension and breakup of the Rodinian supercontinent in the Neoproterozoic to earliest Cambrian. Very locally, diabase dikes of earliest Jurassic age intrude older basement and cover sequences. These dikes were emplaced in the Blue Ridge during continental extension (rifting) and the opening of the Atlantic Ocean in the Mesozoic Era.

From MP 103.3 to MP 110.3 near Roanoke, the BLRI crosses into and out of a part of the Valley and Ridge Geologic Province. Unmetamorphosed sedimentary rocks of Cambrian to Ordovician age – mostly shale, siltstone and carbonate – occur here. These rocks were deposited in a terrestrial to shallow marine environment on the Laurentian continental margin, after extensional breakup of Rodinian supercontinent in the Neoproterozoic and earliest Cambrian, but before mid- to late-Paleozoic orogenesis.

South of Roanoke, the Blue Ridge Geologic Province quickly transitions from an anticlinorium to a stack of imbricated thrust sheets. After crossing the southern end of the Shenandoah Mesoproterozoic basement massif (MP 124.1 to MP 144.4), the BLRI enters the eastern Blue Ridge province, a fault-bounded geologic terrane comprised of high-metamorphic-grade sedimentary and volcanic rocks

deposited east of the Laurentian continental margin from the Neoproterozoic to early Paleozoic. These rocks were significantly metamorphosed, deformed, and transported westward onto the Laurentian margin along major orogenic faults during Paleozoic orogenesis. Sixty bedrock map units underlie the BLRI in Virginia. These units consist of one or more distinguishing lithologies (rock types), and are grouped into formal and informal hierarchal frameworks based on age, stratigraphy (formations-groups), and tectonogenesis. Many of these units exhibit characteristics and field relationships that are critical to our understanding of Appalachian orogenesis. Most of these units are named based on the dominant occurring lithology; other units follow formal nomenclature, some of which was developed and has been used for more than 100 years.

Oldest rocks occurring along the BLRI corridor are Mesoproterozoic orthopyroxene-bearing basement rocks of the Shenandoah massif, in the core of the Blue Ridge anticlinorium. Preliminary SHRIMP U-Pb zircon geochronology (J. Aleinikoff, USGS, written comm., 2013) shows that these rocks can be grouped based on crystallization ages: Group I (~1.2 to 1.14 Ga) are strongly foliated orthogneisses and Group II (~1.06 to 1.0 Ga) are less deformed metagranitoids. Group I orthogneisses, which occur discontinuously from near Irish Gap (MP 37) to Cahas Overlook (MP 139), comprise 10 map units: leucogranitic gneiss (Yllg); megacrystic quartz-monzonitic gneiss (Yqg); granitic gneiss (Yg); lineated granitoid gneiss (Ylgg); garnetiferous leucogneiss (Yglg); Sandy Creek gneiss (Ysg); porphyroblastic garnet-biotite leucogranitic gneiss (Ygtg); dioritic gneiss (Ydg); Pilot gneiss (Ypg); and megacrystic granodioritic gneiss (Ygg). Group II metagranitoids, which are first encountered along the BLRI at Reeds Gap (MP 14) and occur discontinuously to Roanoke River Overlook (MP 115), comprise 8 map units: megacrystic meta-quartz monzonitoid (Yqm); massive metagranitoid (Ymgm); megacrystic metagranitoid (Ypgm); mesocratic porphyritic metagranitoid (Ygpm); metagranodioritoid (Ygdm); Vesuvius megaporphyritic metagranitoid (Yvm); quartz-feldspar leucogranitoid (Yqfm); and Peaks of Otter metagranitoid (Ypom). An additional relatively undeformed metagranitoid with a preliminary SHRIMP U-Pb zircon age of ~1.12 Ga is assigned to the Bottom Creek Suite (Ybcm), and well layered migmatitic gneiss (Ymg) near Irish Gap (MP 37) has a a preliminary SHRIMP U-Pb zircon age of ~1.05 Ga. Other rocks of Mesoproterozoic age include orthogneisses in the Fries thrust sheet between MP 139 and MP 144.5 that range in age from ~1.19 to ~1.07 Ga: biotite-muscovite leucogneiss (Ymlg); biotite granitic augen gneiss (Ybgg); blue-quartz gneiss (Ybqg); and biotite leucogneiss (Yblg). Latest Mesoproterozoic rocks include paragneiss and pegmatite (Yprg) near Porters Mountain Overlook (MP 90), and a suite of igneous intrusive nelsonites and jotunites (Yjn).

Two units, foliated metagreenstone (Zdm) and foliated metagranitoid (Zgm), locally intrude older Mesoproterozoic rocks in the core of the Blue Ridge anticlinorium. Metagreenstone is fine-grained and mafic in composition, and occur as narrow dikes and sills; metagranitoid is medium-grained and generally felsic in composition, and intrude basement rocks as small plutons, stocks, and a few narrow dikes.

On the west limb of the Blue Ridge anticlinorium, metamorphosed sedimentary and volcanic rocks of Neoproterozoic to Cambrian age crop out discontinuously along the BLRI from near Afton (MP 0) to MP 103.3, in the vicinity Roanoke Mountain (MP 120 to MP 124), to near Adney Gap (MP 136). These rocks

are assigned to a formal stratigraphic sequence: Swift Run Formation; Catoctin Formation; Chilhowee Group.

Metasedimentary and meta-igneous rocks of lower Paleozoic (?) to Neoproterozoic age are assigned to the Alligator Back Formation, Lynchburg Group, and Ashe Formation. These units crop out southeast of the Red Valley fault from MP 144.5 southwestward to the North Carolina–Virginia State Line at Mile Post 216.9. Rocks assigned to the Alligator Back crop out in the Blue Ridge Parkway corridor from Mile Post 174.5 southward to the North Carolina–Virginia State Line: compositional-layered biotite-muscovite gneiss (abg); garnet-biotite-muscovite-quartz schist (abs); quartzite and quartz-rich metasandstone (abq); and marble (abm).

The following lithologic map units along the BLRI corridor are correlated with Lynchburg Group formations: graphitic schist (lgs), muscovite-biotite metagraywacke (lmg), and graphite-muscovite-quartz metasandstone (lms). These rocks crop out between the Red Valley fault (Mile Post 144.5) and the Rock Castle Creek fault (Mile Post 174.5).

Coarse-grained- to conglomeratic metagraywacke (acm), underlying Lynchburg Group rocks west of the Rock Castle Creek fault in the vicinity of Rakes Millpond (MP 162.3) and Rocky Knob Visitors Center (MP 169), are considered to be the lower metamorphic grade- equivalent of the higher metamorphic-grade Ashe Formation at its type section in northwestern North Carolina.

Five meta-igneous lithologic map units occur as mappable bodies interlayered or intrusive into metasedimentary rocks of the Alligator Back Formation and Lynchburg Group. Altered ultramafic and ultrabasic rocks (um) occur mostly within the Lynchburg Group, but few thin bodies also occur within laminated amphibolite gneiss (aml) locally (laminated amphibolite gneiss is associated with rocks of the Alligator Back Formation). Amphibolites of the Lynchburg Group include biotite-bearing amphibolite (amb), clinozoisite-bearing amphibolite (amc) and quartz-layered amphibolite (amq).

Map units that occur beneath the Blue Ridge fault are assigned to the Valley and Ridge Province. In the BLRI corridor, these rocks are first exposed near Bearwallow Gap (MP 91) and continue southward beyond Roanoke near MP 125. Oldest formations are Shady Dolomite (Cs) and Waynesboro Formation (Cw), which regionally can be mapped in stratigraphic continuity with cover and basement rocks of the Blue Ridge anticlinorium. Conversely, nowhere in the Appalachians can rocks of the Elbrook Formation (Ce) or Conococheague Formation (Cco) be mapped in direct stratigraphic continuity with Mesoproterozoic basement rocks in the core of the Blue Ridge anticlinorium; however, they do stratigraphically overlie older Waynesboro Formation and Shady Dolomite within imbricates of the Blue Ridge fault system. Ordovician Martinsburg Formation (Omb) occurs beneath the Pulaski fault north of Roanoke River, about 0.85 km northwest of MP 108.

Paleozoic mylonite (Pzmy) is a tectonic rock unit that that occurs in high-strain fault zones in the core of the Blue Ridge anticlinorium from near Afton (MP 0) to Adney Gap (MP 136). Jurassic diabase (Jd) occurs in narrow dikes that intrude older map units, just south of Roanoke River near MP 118 and MP 125, north of James River near MP 56, and in the vicinity of Afton near MP 3 and north of MP 0.

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Data Sources

Abbott, R.N., Jr., and Raymond, L.A., 1984, The Ashe metamorphic suite, northwestern North Carolina: Metamorphism and observations on geologic history: American Journal of Science, v. 284, p. 350-375.

Adams, M.G., Stewart, K.G., Trupe, C.H., and Willard, R.A., 1995, Tectonic significance of high-pressure metamorphic rocks and dextral strike-slip faulting in the southern Appalachians, in Hibbard, J. van Staal, C.R., Cawood, P., and Colman-Sadd, S., eds., Current perspectives in the Appalachian-Caledonian orogen, Geological Association of Canada Special Paper 41, p. 21-42.

Bailey, C.M., Giorgis, S., and Coiner, L.V., 2002, Tectonic inversion and basement buttressing: an example from the central Appalachian Blue Ridge province: Journal of Structural Geology, v. 24, n. 5, p. 925-936.

Bartholomew, M.J., 1981, Geology of the Roanoke and Stewartsville quadrangles, Virginia: Virginia Division of Geology and Mineral Resources Publication 4, 23p.

Bartholomew, M.J., 1977, Geology of the Greenfield and Sherando Quadrangles, Virginia: Virginia Division of Mineral Resources Publication 4, 43p.

Bartholomew, M.J., and Lewis, S.E., 1984, Evolution of Grenville massifs in the Blue Ridge geologic province, southern and central Appalachians, in Bartholomew, M.J., Force, E.R., Sinha, A.K., and Herz, N., eds, The Grenville event in the Appalachians and related topics: Geological Society of America Special Paper 194, p. 229-254.

Bartholomew, M.J., Henika, W.S., and Lewis, S.E., 1994, Geologic and structural transect of the New River valley: Valley and Ridge and Blue Ridge Provinces, southwestern Virginia, in Schultz, A. P. and Henika, W.S., eds., Field guides to southern Appalachian structure, stratigraphy, and engineering geology, Southeastern Section, Geological Society of America, Blacksburg, Virginia, April 7-9, 1994: Virginia Tech Department of Geological Sciences, Guidebook Number 10, p. 177-228.

Bartholomew, M.J., Schultz, A.P., Lewis, S.E., McDowell, R.C., and Henika, W.S., 2000, unpublished digital geologic map of the Radford 30 X 60 minute quadrangle, Virginia and West Virginia:

Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources, scale 1:100,000.

Bloomer, R.O., and Bloomer, R.R., 1947, The Catoctin Formation in central Virginia: Journal of Geology, v.55, p. 94-106.

Bloomer, R.O., and Werner, H.J., 1955, Geology of the Blue Ridge region in central Virginia: Bulletin of the Geological Society of America, V. 66, p. 579-606.

Brown, C.E., and Spencer, E.W., 1981, Geologic map, James River Face Wilderness, Virginia: US Geological Survey Miscellaneous Field Studies, Map MP-1337-A.

Brown, W.R., 1958, Geology and mineral resources of the Lynchburg quadrangle, Virginia: Virginia Division of Geology and Mineral Resources Bulletin 74, 99p.

Brown, W.R., 1970, Investigations of the sedimentary record in the Piedmont and Blue Ridge of Virginia, in Fisher, G.W., Pettijohn, F.J., Reed, J.C., and Weaver, K.N., editors, Studies of Appalachian Geology: Central and Southern: New York, Wiley-Interscience, p. 335-349.

Bryant, B.H., and Reed, J.C., Jr., 1970, Geology of the Grandfather Mountain window and vicinity, North Carolina and Tennessee: U.S. Geological Survey Professional Paper 615, 190 p.

Campbell, E.V., Williams, S.T., Hibbits, H.A., and Reis, J.S., 2005, Interstate 81 corridor digital geologic compilation: Waynesboro East quadrangle, Virginia – Bedrock geology: Virginia Division of Mineral Resources, Open File 06-01, scale 1:24,000.

Campbell, E.V., Williams, S.T., Hibbits, H.A., and Reis, J.S., 2005, Interstate 81 corridor digital geologic compilation: Waynesboro West quadrangle, Virginia – Bedrock geology: Virginia Division of Mineral Resources, Open File 06-01, scale 1:24,000.

Campbell, M.R., 1899, Description of the Bristol Quadrangle [Virginia-Tennessee]: U.S. Geological Survey Atlas of the United States, Bristol Folio, n. 59, 8p.

Carter, M.W., 2012, Transition from the Lynchburg Group to the Ashe and Alligator Back metamorphic suites: New data and new interpretations from detailed mapping along the Blue Ridge Parkway in southern Virginia: Geological Society of America Abstracts with Programs, v. 44, n. 7, p. 590.

Carter, M.W., 2008, Geologic map of a portion of the Montebello 7.5-minute quadrangle, Virginia: Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources, prepared cooperation with the US Geological Survey under the National Cooperative Geologic Mapping Program (STATEMAP component), 2008 Deliverable, scale 1:24,000.

Carter, M.W., 2006, Bedrock geologic map of a portion of the Buchanan and Arnold Valley 7.5-minute quadrangles, Virginia: Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources, prepared in cooperation with the US Geological Survey under the National Cooperative Geologic Mapping Program (STATEMAP component), 2005-2006 Deliverable, scale 1:24,000.

Carter, M.W., Aleinikoff, J.N., and Southworth, S., 2012, Mesoproterozoic to late Paleozoic geology along the Blue Ridge Parkway from James River to Bearwallow Gap, central Virginia: Geological Society of America Abstracts with Programs, v. 44, n. 7, p. 612.

Carter, M.W., Southworth, S., and Aleinikoff, J.N., 2013, Proterozoic to Cenozoic geology above, within and beneath the Blue Ridge Composite Thrust Sheet as exposed along the Blue Ridge Parkway in the Peaks of Otter area, central Virginia: Fieldtrip Guidebook for the 2013 Virginia Geological Field Conference, College of William and Mary, 26p.

Carter, M., and Merschat, A., 2014, Stratigraphy, structure, and regional correlation of eastern Blue Ridge sequences in southern Virginia and northwestern North Carolina: An interim report from new U.S. Geological Survey mapping, in Bailey, C.M., and Coiner, L.V., eds., Elevating Geoscience in the Southeastern United States: New Ideas about Old Terranes: Field Guides for the GSA Southeastern Section Meeting, Blacksburg, Virginia, 2014: Geological Society of America Field Guide 35, p. 215–241.

Conley, J.F., 1981, Stratigraphic relationships between rocks of the Blue Ridge anticlinorium and the Smith River allochthon in the southwestern Virginia piedmont, in Conley, J.F., Marr, J.D., Jr., and Berquist, C.R., Jr., Stratigraphic relationships between rocks of the Blue Ridge anticlinorium and the Smith River allochthon in the southwestern Virginia piedmont, Virginia Division of

Geology and Mineral Resources, 13th annual Virginia geological field conference, p. 1-28.
Conley, J.F., 1987, Mafic rocks in the Alligator Back Formation, the upper unit of the Lynchburg Group, in the southwestern Virginia Piedmont: An ophiolite sequence?: Virginia Division of Mineral Resources Publication 74, Contributions to Virginia Geology V, p. 55-68.
Conley, J.F., 1986, Ophiolites in the Lynchburg Group near Rocky Mount, Virginia, in Neatherly, T.L., ed., Geological Society of America, Centennial Field Guide, v. 6, p. 215-216.
Conley, J.F., 1985, Geology of the southwestern Virginia Piedmont: Virginia Division of Geology and Mineral Resources Publication 59, 33p.
Dietrich, R.V., 1959, Geology and mineral resources of Floyd County, Blue Ridge upland, southwestern Virginia: Virginia Polytechnic and State University, Engineering Experimental Station Bulletin 134, 160 p.
Doug Rankin, unpublished field sheets
Espenshade, G.H., Rankin, D.W., Shaw, K.W., and Neuman, R.B., 1975, Geologic map of the east half of the Winston-Salem quadrangle, North Carolina-Virginia: US Geological Survey Miscellaneous Investigations Series Map I-709-B.
Evans, N.H., 1991, Latest Precambrian to Ordovician metamorphism in the Virginia Blue Ridge: Origin of the contrasting Lovingston and Pedlar basement terranes: American Journal of Science, v.291, p.425-452.
Evans, N.H., unpublished data collected on the Big Levels, Vesuvius, and Buena Vista 30 x 60 minute quadrangles, Virginia: Virginia Division of Geology and Mineral Resources
Federal Geographic Data Committee [prepared for the FGDC by the U.S. Geological Survey], 2006, FGDC Digital Cartographic Standard for Geologic Map Symbolization: Reston, Va., FGDC document number FGDC-STD-013-2006, 290 p., 2 plates.
Furcron, A.S., 1969, Late Precambrian and Early Paleozoic erosional and depositional sequences of northern and central Virginia: Georgia Geological Survey Bulletin 80, p. 57-88.
Gair, J.E., and Slack, J.F., 1984, Deformation, geochemistry, and origin of massive sulfide deposits, Gossan Lead District, Virginia: Economic Geology, v. 79, p. 1483-1520.
Gathright, T.M. II, 1976, Geology of the Shenandoah National Park, Virginia: Virginia Division of Mineral Resources Bulletin 86, 93p.
Gathright, T.M. II, Henika, W.S., and Sullivan, J.L., 1977, Geology of the Waynesboro East quadrangle, Virginia: Virginia Division of Mineral Resources, Publication 3, Plate 1, scale 1:24,000.
Gieger, H.R., and Keith, A., 1891, The structure of the Blue Ridge near Harper's Ferry, with discussion by C.D. Walcott and C.H. Hitchcock: Geological Society of America Bulletin,v. 2, p. 155-164.
Glennie, S.P., 1994, The geology of the Suck Mountain pluton, Blue Ridge province, Virginia [M.S. Thesis]: Washington D.C., George Washington University, 195p.
Good, R.S., 1991, Gold mineralization, and tin, base metals, and thorium anomalies at Yankee Horse Ridge, Irish Creek tin area, Rockbridge County, Virginia: Virginia Division of Mineral Resources Publication 112, 41 p.
Hack, J.T., 1982, Physiographic divisions and differential uplift in the Piedmont and Blue Ridge: U.S. Geological Survey Professional Paper 1265, 49p.
Hammes, L. and Thress, R., unpublished 1:24,000-scale field data collected in 2009 along the Blue Ridge Parkway in southern Virginia, in support of the USGS-NAGT Summer Intern Program, under the direction of C. Scott Southworth and the Appalachian Blue Ridge Project, Virginia and North Carolina: U.S. Geological Survey, Reston, Virginia.
Hatcher, R.D., Jr., 1995, Structural Geology: Principles, Concepts and Problems, second edition: Prentice Hall, Englewood Cliffs, New Jersey, 525 p.
Hatcher, R.D., Jr., 1978, Tectonics of the western Piedmont and Blue Ridge, southern Appalachians: Review and speculation: American Journal of Science, v. 278, p. 276-304.
Hatcher, R.D., Jr., Hooper, R.J., Petty, S.M., and Willis, J.D., 1984, Structure and chemical petrology of three southern Appalachian mafic-ultramafic complexes and their bearing upon the tectonics of emplacement and origin of Appalachian ultramafic bodies: American Journal of Science, v. 284, p. 484-506.
Heller, M.J., Wilkes, G.P., Coiner, L.V., and Carter, M.W., 2010, Geologic map of the Cornwall

Quadrangle: Virginia Division of Geology and Mineral Resources, prepared cooperation with the US Geological Survey under the National Cooperative Geologic Mapping Program (STATEMAP component), 2010 Deliverable, scale 1:24,000.

Henika, W.S., 2011a, Geologic map of the Garden City quadrangle, Virginia: Virginia Division of Geology and Mineral Resources, Open-File Report 2011-2, scale 1:24,000.

Henika, W.S., 2011b, Geologic map of the Hardy quadrangle, Virginia: Virginia Division of Geology and Mineral Resources, Open-File Report 2011-3, scale 1:24,000.

Henika, W.S., 2009, Geologic map of the Elliston 7.5-minute quadrangle, Virginia: Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources, prepared in cooperation with the US Geological Survey under the National Cooperative Geologic Mapping Program (STATEMAP component), 2009 Deliverable, scale 1:24,000.

Henika, W.S., 2007, Geologic map of the Bent Mountain 7.5-minute quadrangle, Virginia: Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources, prepared in cooperation with the US Geological Survey under the National Cooperative Geologic Mapping Program (STATEMAP component), 2007 Deliverable, scale 1:24,000

Henika, W.S., 2000a, unpublished digital geologic map of the Callaway quadrangle, Virginia: Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources, scale 1:24,000.

Henika, W.S., 2000c, unpublished digital geologic map of the Callaway quadrangle, Virginia: Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources, scale 1:24,000.

Henika, W.S., 1997, Geologic map of the Roanoke 30 X 60 minute quadrangle, Virginia: Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources Publication 148, scale 1:100,000.

Henika, W.S., 1981, Geology of the Villimont and Montvale quadrangles, Virginia: Virginia Division of Mineral Resources Publication 35, 18 p.

Henika, W.S. and Campbell, E.V.M., 2007a, Interstate 81 corridor digital geologic compilation: Garden City quadrangle, Virginia, bedrock geology: Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources, prepared in cooperation with the US Geological Survey under the National Cooperative Geologic Mapping Program (STATEMAP component), 2006-2007 Deliverable, scale 1:24,000.

Henika, W.S. and Campbell, E.V.M., 2007b, Interstate 81 corridor digital geologic compilation: Hardy quadrangle, Virginia, bedrock geology: Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources, prepared in cooperation with the US Geological Survey under the National Cooperative Geologic Mapping Program (STATEMAP component), 2006-2007 Deliverable, scale 1:24,000.

Hudson, T.A., 1981, Geology of the Irish Creek tin district, Virginia Blue Ridge [MS Thesis]: University of Georgia, Athens, Georgia, 144 p, scale 1:24,000.

Hudson, T.A., and Dallmeyer, R.D., 1982, Age of mineralized greisens in the Irish Creek tin district, Virginia Blue Ridge: Economic Geology, v. 77, p. 189-192.

John Aleinikoff, U.S. Geological Survey, personal communication

Jonas, A.I., 1927, Geologic reconnaissance in the Piedmont of Virginia: Geological Society of America Bulletin, v. 38, n. 4, p. 837-846.

Jonas, A.I., and Stose, G.W., 1939, Age relations of the Precambrian rocks in the Catoctin Mountain – Blue Ridge and Mount Rogers anticlinorium in Virginia: American Journal of Science, v. 237, p. 575-593.

Keith, A., 1894, Description of the Harpers Ferry Quadrangle [Virginia-Maryland-West Virginia]: U.S. Geological Survey Geologic Atlas of the United States, Harpers Ferry Folio, n. 10, 5p.

King, P.B., 1950, Geology of the Elkton area, Virginia: US Geological Survey Professional Paper 230, 82 p.

Kunk, M.J., Froelich, A.J., and Gottfried, D., 1992, Timing of emplacement of diabase dikes and sheets in the Culpeper basin and vicinity, Virginia and Maryland; 40Ar/39Ar age spectrum results from hornblende and K-feldspar in granophyres [abs.]: Geological Society of America Abstracts with

Programs, v. 24, no. 1, p. 25.
McSween, H.Y., Jr., and Hatcher, R.D., Jr., 1985, Ophiolites (?) of the southern Appalachian Blue Ridge, in Woodward, N.E., ed., Field trips in the southern Appalachians: University of Tennessee, Department of Geological Sceinces, Studies in Geology 9, p. 144-170.
Merschat, C.E., Wooten, R.M., Cattanach, B.L., Latham, R.S., Bozdog, G.N., Witt, A.C., and Carter, M.W., 2008, Digital geologic and geohazard maps and inventories for the North Carolina segment of the Blue Ridge Parkway and Carl Sandburg Home National Historic Site: unpublished N.C. Geological Survey data and GIS data layers prepared for the National Park Service under study BLRI-00065
Miller, B. V., Fetter, A. H., and Stewart, K. G., 2006, Plutonism in three orogenic pulses, eastern Blue Ridge Province, southern Appalachians: Geological Society of America Bulletin, v. 118, p. 171–184.
Misra, K.C., and Conte, J.A., 1991, Amphibolites of the Ashe and Alligator Back Formations, North Carolina: Samples of Late Proterozoic – early Paleozoic oceanic crust: Geological Society of America Bulletin, v. 103, p. 737-750.
Misra, K.C., and Keller, F.B., 1978, Ultramafic bodies in the southern Appalachians: A review: American Journal of Science, v. 278, p. 389-418.
Misra, K.C., and McSween, H.Y., Jr., 1984, Mafic rocks of the southern Appalachians: A review: American Journal of Science, v. 284, p. 294-318.
NCGMP09--draft standard format for digital publication of geologic maps, version 1.1, available at http://ngmdb.usgs.gov/Info/standards/NCGMP09/
Nelson, W.A., 1962, Geology and mineral resources of Albemarle County, Virginia: Virginia Division of Geology and Mineral Resources Bulletin 77, 92p.
Neuendorf, K.K.E., Mehl, J.P., Jr., and Jackson, J.A., 2005, Glossary of Geology, 5th Edition, American Geological Institute, Alexandria, VA, 779 p.
Nystrom, P.G. Jr., 1977, Geology of the Waynesboro West quadrangle, Virginia: Virginia Division of Mineral Resources, Publication 3, Plate 2, scale 1:24,000.
Passchier, C.W, and Trouw, R.A.J. 2005, Microtectonics, Springer, 366 p., and Hatcher, R.D., Jr., 1995, Structural Geology: Principles, Concepts and Problems, second edition: Prentice Hall, Englewood Cliffs, New Jersey, 525 p., modifed from http://en.wikipedia.org/wiki/Cleavage_(geology)
Rader, E.K., and Evans, N.H., editors, 1993, Geologic map of Virginia – expanded explanation: Virginia Division of Mineral Resources, 80 p.
Rankin, D.W., 1970, Stratigraphy and structure of Precambrian rocks in northwestern North Carolina, in Fisher, G.W., Pettijohn, F.J., Reed, J.C., and Weaver, K.N., editors, Studies of Appalachian Geology: Central and Southern: New York, Wiley-Interscience, p. 227-245.
Rankin, D.W., Espenshade, G.H., and Shaw, K.W., 1973, Stratigraphy and structure of the metamorphic belt in northwestern North Carolina and southwestern Virginia: A study from the Brevard fault zone to the Sauratown Mountains anticlinorium: American Journal of Science, Cooper Volume 273-A, p. 1-40.
Rankin, D.W., Stern, T.W., McLelland, J., Zartman, R.E., and Odom, A.L., 1983, Correlation chart for Precambrian rocks of the Eastern United States, in Harrison, J.E., and Peterman, Z.E., eds, Correlation of Precambrian rocks of the United States and Mexico: U.S. Geological Survey Professional Paper 1241-E, p. E1-E18.
Raymond, L.A., and Abbott, R.N., Jr., 1997, Petrology and tectonic significance of ultramafic rocks near the Grandfather Mountain window in the Blue Ridge belt, Toe terrane, western Piedmont zone, North Carolina, in Stewart, K.G., Adams, M.G., and Trupe, C.H., eds., Paleozoic structure, metamorphism, and tectonics of the Blue Ridge of Western North Carolina: Carolina Geological Society 1997, Field Trip Guidebook, p. 67-85.
Raymond, L.A., Swanson, S.E., Allan, J.F., and Love, A.B., 2003, Cr-spinel compositions, metadunite petrology, and the petrotectonic history of the Blue Ridge ophiolites, southern Appalachian orogen, USA, in Dilek, Y., and Bobinson, P.T., eds., Ophiolites in Earth history: Geological Society of London Special Publication 218, p. 253-277.

Raymond, L.A., Yurkovich, S.P., and McKinney, M., 1989, Block-in-matrix structures in the North Carolina Blue Ridge belt and their significance for the tectonic history of the southern Appalachian orogen, in Horton, J.W., and Rast, N., eds., Mélanges and olistostromes of the US Appalachians: Geological Society of America Special Paper 228, p. 195-215.

Reed, J.C., Jr., 1969, Ancient lavas in Shenandoah National Park near Luray, Virginia: U.S. Geological Survey Bulletin 1265, 43p.

Reed, J.C., Jr., 1955, Catoctin Formation near Luray, Virginia: Geological Society of America Bulletin, v. 66, p. 871-896.

Reed, J.C., Jr., and Morgan, B.A., 1971, Chemical alteration and spilitization of the Catoctin greenstones, Shenandoah National Park, Virginia: Journal of Geology, v. 79, p. 526-584.

Southworth, Scott, U.S. Geological Survey, personal communication

Smoot, J.P., 2010, A new working model for deposition and stratigraphy of the Chilhowee Group in the Blue Ridge of Virginia: Geological Society of America Abstracts with Programs, v. 42, n. 1, p. 59.

Smoot, J.P., and Southworth, S., 2014, Volcanic rift margin model for the rift-to-drift setting of the late Neoproterozoic-early Cambrian eastern margin of Laurentia: Chilhowee Group of the Appalachian Blue Ridge: Geological Society of America Bulletin v. 126, n. 1/2, p. 201-218.

Smoot, J.P., and Southworth, S., 2012, Working model for the Chilhowee Group in the Blue Ridge Province: A passive volcanic margin sequence from the opening of the Iapetus Ocean: Geological Society of America Abstracts with Programs, v. 44, n. 7, p. 172.

Southworth, S., Aleinikoff, J.A., Tollo, R.P., Bailey, C.M., Burton, W.C., Hackley, P.C., and Fanning, M. C., 2010, Mesoproterozoic magmatism and deformation in the northern Blue Ridge, Virginia and Maryland: Application of SHRIMP U–Pb geochronology and integrated field studies in the definition of Grenvillian tectonic history in Tollo, R.P., Bartholomew, M.J., Hibbard, J.P., and Karabinos, P.M., eds., From Rodinia to Pangea: The Lithotectonic Record of the Appalachian Region: Geological Society of America Memoir 206, p. 795–836.

Southworth, S., Aleinikoff, J.N., Bailey, C.M., Burton, W.C., Crider, E.A., Hackley, P.C., Smoot, J.P., and Tollo, R.P., 2009, Geologic Map of the Shenandoah National Park Region, Virginia: U.S. Geological Survey Open-File Report 2009–1153, 96p.

Spencer, E.W., 2000, Geology of the Glasgow and Buena Vista Quadrangles, Virginia: Virginia Division of Mineral Resources Publication 154, scale 1:24,000.

Spencer, E.W., 1995, Intersection of the Blue Ridge fault with ductile deformation zones in the Blue Ridge basement: Southeastern Geology, v. 35, p. 123-138.

Spencer, E.W., 1994, Structure of the Blue Ridge at the James River Gap, in Schultz, A., and Henika, W., eds., Field guides to southern Appalachian structure, stratigraphy, and engineering geology: Southeastern Section, Geological Society of America, Virginia Tech Department of Geological Sciences Guidebook Number 10, p. 1-15.

Spencer, E.W., 1992, The Blue Ridge flank – Glasgow to Buchanan: Virginia Field Conference Field Guide, Lexington, Virginia.

Spencer, E.W., 1968, Geology of the Natural Bridge, Sugarloaf Mountain, Buchanan and Arnold Valley Quadrangles, Virginia: Virginia Division of Mineral Resources Report of Investigations 13, scale 1:24,000.

Spencer, E.W., Bell, J.D., Kozak, S.J., 1989, Valley and Ridge and Blue Ridge traverse, central Virginia: 28th International Geological Congress, Field Trip Guidebook T157, 66p.

Spencer, E.W., unpublished data collected on the Big Island and Snowden quadrangles, Virginia: Washington and Lee University, Department of Geology.

Stewart, K.G., Adams, M.G., and Trupe, C.H., 1997, Paleozoic structural evolution of the Blue Ridge thrust complex, western North Carolina, in Stewart, K.G., Adams, M.G., and Trupe, C.H., eds., Paleozoic structure, metamorphism, and tectonics of the Blue Ridge of Western North Carolina: Carolina Geological Society 1997, Field Trip Guidebook, p. 21-32.

Stose, A.J., and Stose, G.W., 1946, Geology of Carroll and Frederick Counties: Maryland Department of Geology, Mines and Water Resources, Carroll and Frederick Counties Report, p. 11-131.

Stose, A.J., and Stose, G.W., 1957, Geology and mineral resources of the Gossan Lead district and

adjacent areas in Virginia: Virginia Division of Geology and Mineral Resources, Bulletin 72, 233p.

Tollo, R.P., Bartholomew, M.J., and Rankin, D.W., 1994, Geology and tectonic significance of a late Proterozoic anorogenic silicic supersuite, Laurentian Appalachians, Virginia and North Carolina: Geological Society of America, Abstracts with Programs, v. 26, n. 4, p. 66.

Tollo, R.P., Lowe, T.K., Arav, S., and Gray, K.J., 1991, Geology of the Roberston River Igneous Suite, Blue Ridge province, Virginia, in Schultz, A., and Compton-Gooding, E., eds., Geologic evolution of the eastern United States: Field trip guidebook NE-SE GSA 1991: Virginia Museum of Natural History Guidebook, Joint Meeting of Geological Society of America, Northeastern Section and Southeastern Section, n. 2, p. 229-262.

Virginia Division of Mineral Resources, unpublished data

Walsh-Law, C.A., Dove, P.M., Bartholomew, M.J., and Wadman, H.M, 1999, unpublished digital geologic map of the Check quadrangle, Virginia: Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources, scale 1:24,000.

Wang, P., 1991, Geology and tectonic significance of the late Precambrian eastern Blue Ridge cover sequence in central Virginia [PhD thesis]: Blacksburg, Virginia Polytechnic Institute and State University.

Wehr, F. L., II, 1985, Stratigraphy of the Lynchburg Group and Swift Run Formation, Late Proterozoic (730-570 Ma) central Virginia: Southeastern Geology, v. 25, n. 4, p. 225-239.

Wehr, F. L., II, 1983, Geology of the Lynchburg Group in the Culpeper and Rockfish River areas, Virginia [PhD Dissertation]: Blacksburg, Virginia Polytechnic Institute and State University, 245p.

Wehr, F. L., II, and Glover, L., III, 1985, Stratigraphy and tectonics of the Virginia – North Carolina Blue Ridge: Evolution of a late Proterozoic – early Paleozoic hinge zone: Geological Society of America Bulletin, v. 96, p. 285-295.

Whitten, D.G.A. and Brooks, J.R.V., 1988, The Penquin Dictionary of Geology: Penquin Books, London, England, 495 p., one appendix.

Wilkes, G.P., Spencer, E.W., Evans, N.H., and Campbell, E.V., 2007, Geology of Rockbridge County, Virginia: Virginia Division of Mineral Resources Publication 170, 31p, scale 1:50,000.

Williams, S.T., 2007, Geologic map of the Vesuvius 7.5-minute quadrangle, Virginia: Virginia Division of Mineral Resources, Open File 07-04, scale 1:24,000.

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The information in this document is intended to accompany the digital geologic-GIS map and other digital data for the northern portion of Blue Ridge Parkway, Virginia and North Carolina (BLRI) developed by Stephanie O'Meara and Jim Chappell (Colorado State University; see the GRI Digital Map and Source Map Citation section of this document for all sources used by the GRI in the completion of this document and related GRI digital geologic-GIS map).

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