



DISCUSSION
This is a map of the crystalline bedrock units in the Piedmont of Delaware and adjacent Pennsylvania. The southern boundary of the mapped area is the 38° 00' latitude line. The geologic formation from the Delaware Geological Survey (DGS) website; data on individual rock types can be found in the DGS Data Repository.

REFERENCES
Alcock, J. E., 1989. Tectonic units in the Pennsylvania-Delaware Piedmont: Evidence from regional metamorphism and structure. Ph.D. dissertation, Pennsylvania State University, University Park, PA, 100 pp.

Plank, M. O., Srogi, L., Schenck, W. S., and Plank, T. A., in press. Geochemistry of the mafic rocks, Delaware Piedmont and adjacent Pennsylvania and Maryland. Delaware Geological Survey Report of Investigations No. 60.

Our model for the geologic history of the Delaware Piedmont is one of eastward dipping subduction and closure of a forearc basin bringing magmatic arc crust over the basin, metamorphic overthrusting, and continental crust during the Taconic orogeny. The metamorphic rocks and the Rockford Park Gneiss and Windy Hill Gneiss as metamorphic volcanic and volcaniclastic rocks. U-Pb ages of zircon crystallization of zircon for these eight units within the Wilmington Complex range between 488 and 470 Ma (John N. Aleksovich, U.S. Geological Survey, personal communication, 2000).

Alcock, J. E., and Wagner, M. E., 1995. Metamorphic discontinuities in the Pennsylvania-Delaware Piedmont: evidence for early Paleozoic assembly. *Journal of Metamorphic Geology*, 13, 69-89.

Srogi, L., and Schenck, W. S., 1997. The Setters Formation in the Pleasant Hill valley, Delaware: metamorphism and structure. Delaware Geological Survey Report of Investigations No. 56, 10 p.

Although pervasive deformation and upper amphibolite to granulite facies metamorphism have obscured most igneous fabric and contact relationships in the Wilmington Complex, we consider the Brandywine Blue Gneiss, Brandy Mill Gneiss, Monks Hill Gneiss, Mill Creek Metagabbro, and Christman Gneiss as metamorphic volcanic rocks, and the Rockford Park Gneiss, Franklin Gneiss, and Windy Hill Gneiss as metamorphic volcanic and volcaniclastic rocks. U-Pb ages of zircon crystallization of zircon for these eight units within the Wilmington Complex range between 488 and 470 Ma (John N. Aleksovich, U.S. Geological Survey, personal communication, 2000).

Crawford, M. L., and Crawford, V. A., 1980. Metamorphic and tectonic history of the Pennsylvania Piedmont. *Journal of the Geological Society of London*, v. 37, p. 313-320.

Wagner, M. E., and Srogi, L., 1997. Early Paleozoic metamorphism at two crustal levels and a tectonic model for the Pennsylvania-Delaware Piedmont. *Geological Society of America Bulletin*, v. 109, p. 1-25.

The intergrading of possible Wislouchian metamorphisms (see Fig. 1 in the Fieldbook Geology) with Wilmington Complex volcanic and volcaniclastic rocks plus the identification of a small slice of Rockford Park Gneiss that intrudes the Wislouchian Formation in Glass Mills, Pennsylvania (Bohly et al., 1999), suggests that the Wislouchian Formation and Wilmington Complex came into contact early in history of the arc. Isotopic evidence based on metamorphic zircon in the Brandywine Blue Gneiss contains the high grade metamorphism to 441 Ma (Graham and Wagner, 1997; Wagner and Srogi, 1997) and 412-416 Ma (John N. Aleksovich, U.S. Geological Survey, personal communication, 2000). The metamorphic ages are similar to the igneous ages of the younger plutons that intruded during the rifting event at about 422 Ma and 412 Ma and indicate that the granulite metamorphism was associated with high heat flow developed during a rifting event.

Crawford, M. L., and Mark, L. E., 1982. Evidence from metamorphic rocks for overthrusting, Pennsylvania Piedmont, U.S.A. *Canadian Mineralogist*, v. 20, p. 333-347.

Wagner, M. E., and Srogi, L., 1997. Early Paleozoic metamorphism at two crustal levels and a tectonic model for the Pennsylvania-Delaware Piedmont. *Geological Society of America Bulletin*, v. 109, p. 1-25.

Previous studies have modeled the thrust emplacement of the Wislouchian Formation and the folding and flattening of the Mill Creek Nappe as events that occurred during northwest directed Taconic compression. These events probably represent a continuum beginning with the deformation of the Brandywine Gneiss, the Glenam Cove unit, and the Wislouchian Formation. As subduction closed the forearc basin between the magmatic arc and ancient continent, Wislouchian rocks were thrust over developing apices in the Brandywine Gneiss and its Glenam cover. Folding continued, and this thrust thrust contact was also folded. In a final compression, these thrusts developed that cut the first thrust and brought the Brandywine Gneiss and Glenam Group over Wislouchian to the northeast (Srogi, 1989, 1991, and 1994; Woodford and Frank, 1995; Plank and Schenck, 1997).

Crawford, M. L., and Mark, L. E., 1982. Evidence from metamorphic rocks for overthrusting, Pennsylvania Piedmont, U.S.A. *Canadian Mineralogist*, v. 20, p. 333-347.

Wagner, M. E., and Srogi, L., 1997. Early Paleozoic metamorphism at two crustal levels and a tectonic model for the Pennsylvania-Delaware Piedmont. *Geological Society of America Bulletin*, v. 109, p. 1-25.

This map accompanies Delaware Geological Survey (DGS) Report of Investigation No. 70 "Bedrock Geology of the Piedmont of Delaware and Adjacent Pennsylvania." Paper copies of this map as DGS Geologic Map Series No. 10 are available as print or as a PDF file, or downloadable digital files from the DGS website at <http://www.dgs.de.state.pa.us>. A digital image of the map in Adobe Portable Document File format (PDF) can be found under the "Publications" button. Digital topographic, hydrology, boundary, topography, and geology layers in ARC/INFO, and ARC View formats can be found under the "Technology Transfer" button. An Excel file containing the source location, lithology, and strike and dip information is also available through the DGS Data Repository located at the same URL. For a complete "Publications" page, visit <http://www.dgs.de.state.pa.us>.

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