

## Igneous Rocks of New York City

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Igneous rocks in the Manhattan Prong occur as two distinct varieties: (i) in situ partial melt veins and pockets associated with metamorphism and (ii) larger coherent intrusive bodies. Partial melt veins and pockets (frequently referred to as pegmatites because they show pegmatitic textures) occur throughout the schists, both cross-cutting and following foliation. These bodies are generally small, 1–2 m wide, and have igneous textures as they are partial melts that formed in response to prograde metamorphism.

The second type of igneous rocks consists of large intrusive bodies that are unrelated to in situ partial melting. The best example of this is the Ravenswood Granodiorite, occurring primarily in Long Island City just north and south of the Queensboro Bridge. This is a coarse-grained granodiorite, with large (1 m) mafic enclaves. In some cases, there is textural evidence of shearing, and this unit has been correlated with the more deformed Harrison Gneiss in Connecticut (Merrill and Magnus, 1904; Pellegrini, 1975; Ziegler, 1911).

Our reconnaissance mapping in the northern Bronx has identified an additional, previously unmapped pluton, exposed at the Bronx Zoo, in and around the bear enclosure (which we refer to as the Bear's Den Granite). This granite is extensive enough to be considered a true pluton rather than a small, localized intrusion, as it occurs extensively at the bear enclosure and the facilities building, ~0.5 km apart from each other. This unit is a very coarse-grained pegmatite with notable large (15 cm, locally up to 30 cm) single crystal K-feldspar grains. K-feldspar are poikilitic with garnet, quartz, feldspar, and apatite inclusions. One exposure near the work shed at the zoo contains a several-meter-sized block of schist included in the granite as a xenolith or roof pendant. Zircon crystals in the Bear's Den Granite are distinctive: up to a millimeter in length, dark brown to black, with a very high uranium concentration, and they are not cathodoluminescent. The grains are highly metamict and discordant, and with dates of  $400 \text{ Ma} \pm 15$ . This age is slightly unexpected for southern New York, but ca. 400 Ma is a commonly reported Acadian age of plutons in northern New England (De Yoreo et al., 1989).

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Merrill, F.J.H., 1890, On the metamorphic strata of southeastern New York: *American Journal of Science*, 3rd series, v. 39, p. 383–392.

Ziegler, V., 1911, The Ravenswood granodiorite: *New York Academy of Sciences Annals*, v. 21, p. 1–10.