

GONIATITE ZONATION OF THE NEW YORK STATE DEVONIAN

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Goniatites are not uncommon in calcareous shales concretions, shales and siltstones in western New York and typically horizons bearing them tongue eastwards towards the more littoral deposits of the Catskills. Earlier goniatite horizons, in general, tongue farther east than the later horizons. Thus the Cherry Valley agoniatic fauna is known almost to the Helderbergs, whilst the latest Famennian faunas, of the Gowanda and Ellicott Shales, have not been traced farther east than Chautauqua County. Faunas lack generic diversity when compared with corresponding European faunas, but they have a value far exceeding this apparent poverty since the horizons may be placed within successions which are known with greater stratigraphic precision than those of Europe. Their importance in establishing a zonal standard and for evolutionary studies generally cannot be over emphasized.

The most striking absentees from the New York goniatite faunas are, from the Middle Devonian, *Maenioceras*, *Sobolewia* (both known in Virginia), *Wedekindella* (known with *Maenioceras* in Canada), *Anarcestes* and *Pinacites*. The Senecan shows greater European affinity, but the probable absence of *Koenenites* (known in Michigan) and *Timanites* (known in Canada) and the rarity of *Beloceras* is striking. Only three genera of Famennian goniatites are known and clymenids are apparently absent. Future collecting may nevertheless yield more records. Elsewhere the author has related the unusual features of the goniatite faunas to a possible migration route from Europe and European Russia via the Arctic, around the northern borders of the Old Red Sandstone continent (House 1964).

ONONDAGA FORMATION

The earliest certain goniatite occurrence in the state is *Foordites* cf. *Buttsi* (Miller) from the Nedrow member (Oliver 1956). This genus is not known before the Eifelian in Europe. No indubitably Lower Devonian goniatites are known.

HAMILTON GROUP

The first probable Givetian indicator is *Cabrieroceras plebeiforme* (Hall) from the *Werneroceras* Bed (Rickard 1952) just below the Cherry Valley Limestone: it occurs with *Parodiceras* sp. and *Subanarcestes* cf. *micromphalus* (Roemer). Shales immediately above the *Werneroceras* Bed contain *Agoniatites nodiferus* (Hall) (*vide* Rickard).

The Cherry Valley Limestone has yielded the types of *Agoniatites vanuxemi* (Hall), *A. intermedius* Flower, and *A. floweri* Miller, but it has been suggested (House 1962, p. 254) that these may be synonyms. In view of the importance of its descendants, *Parodiceras discoideum* (Hall) may be used as the zonal index. The succession given here for the higher Hamilton is substantially more detailed than an earlier generalized statement by the author in 1962. This results from study of the Tornoceratidae (House 1965). Skaneateles tornoceratids, *T. (T.) arkonense* etc., (better known from the Ontario contemporaries) are characterized by a shallower lateral lobe than those of the Ludlowville [*T. (T.) uniangulare widderi*], and this trend, essentially towards an increasingly steep ventrad face to the laterumbilical saddle continues in the Moscow with the genotype from the Leicester Pyrite, *T. (T.) uniangulare uniangulare* (Conrad). A distinct ribbed form first noted by Professor J. W. Wells, from the King Ferry Shale on Cayuga Lake has been named *T. (T.) amuletum*. It is probable, but not certain, that this species is younger than *T. (T.) uniangulare aldenense* from the Alden Marcasite. Agoniatitids are also not uncommon in the Hamilton, but these have not, as yet, been studied in detail. The highest agoniatitid known is *Sellagoniatites unilobatus* (Hall) from Norton's Landing, Cayuga Lake. This genus occurs in the Canadian N. W. T. and in Europe is restricted to the upper Givetian (House and Pedder 1963, p. 512).

GENESEEE GROUP

The earliest occurrence of Frasnian goniatites is in the Tully where *Pharciceras amplexum* occurs. Tornoceratids are common including forms comparable to *T. (T.) arcuatum* (House) from the Koenenites-bearing Squaw Bay Limestone of Michigan.

Typical lowest Frasnian ponticeratids occur in the Genesee Shale, especially *P. perlatum* (Hall), and others, also *Epitornoceras peracutum* (Hall), the latter a rare genus also known in the European low Frasnian. From the Genundewa Limestone come the types of *Probeloceras genundewa*, *Manticoceras apprimatum*, *M. contractum*, *M. fasciculatum* and *M. styliophyllum*. At Bethany Center *T. (T.) uniangulare compressum* is abundant. The record of a *Koenenites* from the West River Shale may be based on a *Manticoceras*.

SONYEA GROUP

From The Middlesex shale there are several records of noded goniatites probably referable to *Sandbergeroceras*. Goniatites are rare at this level and all so far found are crushed.

The fauna of the Cashaqua Shale is rich and varied. This is the source of *Probeloceras lutheri*, *P. (?) accelerans*, *Manticoceras sinuosum*, *M. tardum*, *M. neapolitanum* (formerly thought to be a ciymenid), *Neomanticoceras naplesense*, *Eobeloceras* and probably also *Sandbergeroceras*. The fauna is at present being studied by Mr. W.T. Kirchgasser of Cornell. Particularly famous is the horizon of concretions with barytic replacements which lies some six feet below

the top of the formation in the gullies between Conesus and Honeoye Lake and especially in Shurtleff's Gully, 2.75 miles S. E. of Livonia.

WEST FALLS GROUP

There are singularly few records from the Rhinestreet Shale. At the top of the Unit *Manticoceras* and *Tornoceras* occur in concretionary horizons just below the 'Scraggy Bed' on Big Sister Creek and thereabouts. Large manticoceratids occur in giant concretions around the northern promontory of Grandview Bay. From the Angola Shale, however, many fine specimens are known. Recent work by the author has shown that Clarke's Big Sister Creek localities lie in the lower part of the Angola Shale where cyclothemic units of black shale, worm burrowed shale, grey shale and shale with concretions are repeated many times. A succession of the lowest six of these has been traced bed-for-bed as far east as the Warsaw Valley. The Gibson's Glen goniatite horizon is higher than these. The concretionary horizons almost invariably yield goniatites, but these become rarer to the east. Manticoceratids are chiefly of the *M. rhynchostoma* group and oxyaonic groups: *Aulatormoceras* and *Tornoceras* are also common. Scattered records are known from the Gardeau, and farther east the records of *Beloceras* by Wells (1956) and of *Shindewolfoceras* are of interest in that they have not yet been found in supposed equivalent rock in the west.

JAVA GROUP

Goniatites are extremely rare in the Pipe Creek Shale, but from the Hanover Shale, especially from nodules in the lower fifteen feet, they are not uncommon. This is probably the source of the types of *M. cataphractum* and *Aulatormoceras rhysum*.

CANADAWAY GROUP

No goniatites are yet known from the Dunkirk Shale or South Wales Shale. From the Gowanda Shale at Corell's Point on Lake Erie shore 250 yards S.W. of the outlet of Walker Creek, 2.85 miles west of Brocton, Chatauqua Co. (House 1962) the *Cheiloceras* fauna is known. The same horizon, with *Cheiloceras amblylobum*, *Tornoceras* (*T.*) *concentricum* and *Aulatormoceras bicostatum* has now been located, in an identical concretionary layer, in Little Canadaway Creek below Lamberton, 2,200 feet N.W. of the junction of Lake Road and Rt. 20 at an altitude of about 630 feet, and again in Walnut Creek, below Forestville, about 200 yards upstream of the railroad culvert and at an altitude of about 847 feet. It is now clear that the horizon which yielded the types of *Aulatormoceras clarkei* is lower than this and occurs three feet above a 2 inch siltstone in the creek floor below the Sheridan Road bridge over Walnut Creek at Forestville. Both horizons are in the upper part of the Gowanda Shale.

CONNEAUT GROUP

The only record from this group is still the *Sporadoceras cf. pompecki* recorded by the author from the Ellicott Shale in Porter's Creek, Summerdale (House 1962). Higher horizons have not yet yielded goniatites in New York, but in Pennsylvania from near the horizon of the Panama Conglomerate comes *Sporadoceras milleri*. The occurrence of probable *Chonopectus* in the Corry Sandstone is of interest in that the same genus occurs with Famennian clymenids in the English River Formation of Iowa and forms allied to *Chonopectus (Whidbornella etc)* occur in the late Famennian in England. Syringothyrids are not critical in this respect.

CORRELATIONS WITH EUROPE

The writer has little to add to his views expressed in 1962. Regarding the position of Tully, it is still the case (as in 1962) that critical conodont zonation of the type Frasnian and Givetian has not been made. Until this is done any views are rather speculative. Farther the correlation between the conodont and ammonoid zonations in Europe is still, in the author's opinion, unsatisfactory. Clearly more critical work on the faunal successions both in Europe and New York is required before any dogmatic opinion can be given.

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REFERENCES

- House, M. R., 1962, Observations on the ammonoid succession of the North American Devonian, *Jour. Paleont.*, 36, 247-284.
- _____, 1964, In *Problems of Palaeoclimatology*, Ed. A. E. M. Nairn, Interscience Publications, p. 262-269, 299-301.
- _____, 1965, A study in the Tornoceratidae: the succession of Tornoceras and related genera in the North American Devonian, *Phil. Trans. Roy. Soc. London* (in Press).
- _____ and Pedder, A. E. H., 1963, Devonian goniatites and stratigraphical correlations in western Canada. *Palaeontology*, 6, 491-539.
- Oliver, W. A., 1956, *Tornoceras* from the Devonian Onondaga Limestone of New York. *Jour. Paleont.*, 30, 402-405.
- Rickard, L. V., 1952, The Middle Devonian Cherry Valley Limestone of eastern New York. *Amer. Jour. Sci.*, 250, 511-522.