ART. XXXVIII.—*Note on the Age of the Tribes Hill Formation*; by PERCY E. RAYMOND.*

IN a recent paper on the age and relations of the Little Falls dolomite of the Mohawk Valley, Ulrich and Cushing† have separated the upper "fucoidal beds" of Emmons from the non-fossiliferous dolomite below, and have given them the formation-name Tribes Hill. This formation they consider to be of the age of the Lower Beekmantown, and state that it is separated by an unconformity from the underlying dolomite, which they assign to the Ozarkian.

In a paragraph on the age of the Tribes Hill formation, they state: "That the Tribes Hill is younger than any known Ozarkic formation is satisfactorily shown by the presence of *Asaphus* and three or four other trilobites that are wholly unknown in Ozarkic faunas. The same is true of the *Ribeirias*; and the *Dalmanella? wemplei* also is a type that has not been observed below the Canadian. With the exception of *Eccyliomphalus multiseptarius*, the testimony of the gastropods is less positive, very similar, though specifically distinct, forms being found in Ozarkic faunas. The gastropods described by Cleland from the upper chert zone of the Little Falls dolomite at Little Falls are clearly Ozarkic types and hence are not referred to in this paragraph."

The writer has recently restudied the trilobites which occur in the fauna described by Cleland from Fort Hunter, and finds that the *Asaphus canalis?* of that fauna is in no way related to the *Asaphus canalis* of the Beekmantown of the Champlain Valley, but belongs to that division of the Asaphidæ in which the hypostoma is not forked. The trilobite proves to belong to the genus *Asaphellus*, and is redescribed as a species of that genus in a paper now in press. The trilobite described by Weller‡ from Columbia, New Jersey, as *Isotelus canalis* may be the same species.

Another Asaphid with an undivided hypostoma is the "*Asaphus marginalis*" mentioned by Collie§ as occurring in a zone 3,750 feet below the top of the Beekmantown at Bellefonte, and as Ulrich and Cushing state, the fauna occurring with this Asaphid in the Bellefonte section is so similar to that of the Tribes Hill, that the two may safely be correlated.

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† Sixth Report of the Director of the Science Division, New York State Museum, 1910, p. 97.

‡ Pal. New Jersey, vol. iii, pl. 3, figs. 5, 6.

§ Bull. Geol. Soc. Am., vol. xiv, p. 407, 1903.

Another Asaphid of the Tribes Hill is the *Asaphus convexus* Cleland = *Bathyrurus levis* Cleland = *Illænururus columbiana* Weller. The narrow axial lobe of the pygidium, as well as the general shape, show that this species is more closely related to *Symphysurus* than to the typical species of *Illænururus*. After untangling the synonymy this species appears to emerge under the name *Symphysurus convexus* (Cleland).

Except for a few species of *Nileus*, information about Asaphids with unforked hypostomas is practically wanting in America, though several species are known. For knowledge of the stratigraphic value of this group, we must, then, turn to Europe, where numerous species are known in Great Britain, France and Scandinavia. In all these countries, *Asaphellus* and *Symphysurus* occur together in the Tremadoc, above the Cambrian and below the range of Asaphids with forked hypostomas. The only *Asaphellus* previously known from the American continent is that described by Matthew* from strata immediately overlying the Cambrian on Cape Breton island. The fauna found there with the *Asaphellus* is a small one, and not closely allied to the one found at Fort Hunter.

Brögger† has pointed out that the Tremadoc (*Euloma-Niobe* fauna) occurs in America, but its exact position and full fauna have never been worked out. Brögger listed a number of species indicating this fauna in Newfoundland and in the conglomerates at Point Levis. *Niobe morrissi* (Billings) was mentioned by him as representing the Asaphids with unforked hypostoma, and to this may be added *Asaphus illænoides* Billings, which is a *Symphysurus*, and *Asaphus goniurus* Billings, a *Megalaspides*. These are, in turn, associated with *Dicelocephalus magnificus* Billings, and, therefore, older than Beekmantown. *Asaphellus* and *Symphysurus* seem, then, to be genera characteristic of the fauna immediately following the Cambrian.

With *Asaphus* removed from the list of trilobites of the fauna of the Tribes Hill the aspect is not very modern, and with the gastropods only specifically distinct from those of the Ozarkian, the whole fauna seems as much Ozarkian as Beekmantownian.

According to Ulrich and Cushing, the stratigraphy shows that the Tribes Hill formation is younger than the Hoyt formation which carries the Saratogan fauna described by Walcott. The fauna of the Hoyt limestone is stated to be similar to that of the Gasconade chert of the Ozarkian of Missouri. The top of the Gasconade chert is from 120–475 feet below the top of

* Bull. Nat. Hist. Soc., New Brunswick, vol. iv, part v, 1902.

† Nyt. Mag. f. Naturvidensk., vol. xxx, 1896, p. 164.

the Ozarkian of Bain and Ulrich's section,* so that there is a place for the Tribes Hill above the Gasconade, if it is to be placed in the Ozarkian instead of the Beekmantown.

All that we now know about the fauna of the Ozarkian is what is given by Ulrich in the paper first referred to in this note, and by Schuchert in "Paleogeography of North America." If the fauna is to be defined as consisting of "Cambrian trilobites and Ordovician gastropods and cephalopods," then the fauna of the Tribes Hill certainly has an Ozarkian aspect, with *Asaphellus*, *Symphysurus*, and *Harrisia* as the common trilobites.

Ottawa, Sept. 1910.

* Bull. U. S. Geol. Survey, No. 267, 1905.