

REVISION OF SOME PHACOPID GENERA.*

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INTRODUCTION.

In the preparation of a monograph on the fauna of the Silurian Arisaig series, it has been found necessary to revise the interpretation of several Phacopid genera; for the definitions now used are not considered to be in accord with the evolution of this trilobite family. *Dalmanitina* Reed, *Phacopidella* Reed and *Phacops* Emmrich are redefined. The equivalent of *Acaste* Goldfuss and *Acaste* Salter is pointed out. *Portlockia* McCoy is revived and emended, with subgeneric rank, for the Silurian ancestors of Devonian *Phacops*, s. str. The generic name *Clockeria* Wedekind is found to be untenable. *Phacopina* Clarke is not considered to be a true Phacopid and is placed in the subfamily Dalmanitinae.

In order that the proposed definitions of the above genera may be established on a genetic basis, the evolution of that portion of the family Phacopidae concerned is treated first.

EVOLUTION.

Both Hoernes (1880) and Reed (1905) recognize in such Ordovician forms as *Dalmania socialis* Barrande a generalized and primitive expression of this family. The cephalon is characterized by well-marked pentamerism, all the glabella furrows being fully developed. The glabella is relatively high and narrow, with the lateral borders subparallel, or at most only slightly diverging. The genal angles are rounded off or produced merely into short spines. The pygidium has few segments and is rounded on the posterior border. This generalized stock continues into the Silurian. It is represented there by forms like *Phacops* (*Acaste*) *constricta* Salter and *Calymene downingiae* Murchison which show no important modification of either the cephalon or pygidium except rarely the slight mucronation of the latter. Closely associated with the parent line are a number of forms slightly modified in the direction of the Phacopinae by obsolescence of the two anterior pairs of glabella furrows. But the glabella is still high, its borders are not conspicuously divergent and the third pair of side lobes are not greatly reduced. They cannot be regarded as Phacopid. This slight modification reoccurs in the Ordovician, Silurian and Devonian. In the Ordovician this departure from the primitive type is exhibited by *Dalmania phillipsi* Barrande and *D. solitaria* Barrande. The only important modification here is

the obsolescence of the two anterior furrows. In the Silurian a similar modification is shown in the Arisaig *Dalmania logani* Hall, but since it exhibits all gradations with a primitive form *D. logani* var. *conservatrix*, n. var., it is thought to be independent of the Ordovician forms and not derived out of them. A Devonian departure from the primitive stock of the same nature is to be found in such species as *Phacops braziliensis* Clarke and *P. anceps* Clarke, which Clarke has incorporated into his genus *Phacopina*. The change here is not much more than in *D. logani* or the similar Ordovician species and cannot be compared with the profound modification of the Phacopinae.

Several Ordovician species show a slight modification of the normal *Dalmanitina* type by a broadening anteriorly of the glabella, but retaining the primitive pentamerism. The third pair of glabella lobes, although small, are not markedly reduced and are tuberculate at the extremities as in the Phacopinae. Such forms are *Phacops* (*Acaste*) *alifrons* Salter (1864, p. 33) and *Phacops jamesii* Portlock (Salter 1864, p. 32). Another modification of the generalized line in the Ordovician is exhibited by the species *Phacops brongniarti* Portlock (Salter 1864, p. 34) which while retaining the primitive pentamerism of the glabella shows a considerable broadening anteriorly of the latter and a very considerable reduction of the third pair of side lobes with tuberculation of their extremities. In the last character this is a very near approach to the Phacopinae. This subfamily, however, does not appear until the early Silurian.

In very late Ordovician or earliest Silurian time the generalized line of the Phacopidae gave rise to two quite far removed groups, both of which are very distinct from the coeval primitive stock. On the one hand, as Reed has noted (1905, pp. 176, 224), arose *Dalmanites* Barrande and related genera, in which the frontal lobe becomes semi-detached from the remainder of the glabella by the broadening of the anterior pair of furrows, the genal angles become produced into spines, the pygidium has numerous segments, its axis becomes more slender and it is nearly always mucronate or produced in a spine. An intermediate form, *Dalmanites weaveri* (Salter) appears in the early Silurian (Upper Llandovery) in which the pygidium is not mucronate and the genal angles are not produced into spines. In the Devonian in particular this stock becomes highly differentiated in spinescence, modification of glabella, etc.

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