On the Discovery of Phacops (s.s.) from the Nakazato Series (Middle Devonian) of the Kitakami Mountainland, Japan*

By

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Remains of trilobites are exceedingly rare in the Japanese palaeozoic, and there

Table 1. The succession of the palaeozoic strata in the southern Kitakami Mountainland, previously published by the senior author is as follows:

<table>
<thead>
<tr>
<th>Geological age</th>
<th>Formation</th>
<th>Characters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permian</td>
<td>Toyoma series</td>
<td>Slate, fossils rare.</td>
</tr>
<tr>
<td>Kazanian ↓</td>
<td>Maiya series</td>
<td>Slate, sandstone, conglomerate and limestone; limestone dominant in the lower part. Fossils: Fusuloids, brachiopods, bryozoa, corals, trilobites, calcareous algae, etc.</td>
</tr>
<tr>
<td>Sakmarian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carboniferous</td>
<td>Onimaru series</td>
<td>Heavy bedded slate and limestone in alternation, with schiststein in the upper part. Fossils: Corals, brachiopods, etc.</td>
</tr>
<tr>
<td>Moscovian</td>
<td>Tykanzi series</td>
<td>Trachytic tuff, slate, sandstone and limestone; very fossiliferous in the lower part. Fossils: Brachiopods, corals, bryozoa, trilobites, ammonites, etc.</td>
</tr>
<tr>
<td>Visean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tournaisian</td>
<td>Ōmori series</td>
<td>Fine grained trachytic tuff, more or less conglomeratic in the basal part; particularly fossiliferous in the upper part. Fossils: Trilobites, brachiopods, bryozoa, etc.</td>
</tr>
<tr>
<td>Etrengtian</td>
<td>Nakazato series</td>
<td>Trachytic tuff, with conglomerate in the basal part, fossiliferous in the upper part. Fossils: Brachiopods, trilobites, radiolaria, etc.</td>
</tr>
<tr>
<td>Devonian</td>
<td>Ōno series</td>
<td>Partly green adinole and partly siliceous slate, with a limestone in the basal part which is very fossiliferous. Fossils: Corals, crinoids, stromatoporoids, radiolaria, etc.</td>
</tr>
<tr>
<td>Gedinian</td>
<td>Takainari series</td>
<td>Chiefly green adinole, with reddish purple radiolarian slate in the basal part. Fossils: Radiolaria.</td>
</tr>
<tr>
<td>Downtonian</td>
<td>Kawanti series</td>
<td>Heavy bedded limestone and phyllitic slate, in alternation, limestone very dominant in the lower part and very fossiliferous. Fossils: Stromatoporoids, corals, bryozoa, calcareous algae, trilobites, brachiopods, etc.</td>
</tr>
</tbody>
</table>

* Transactions of the Palaeontological Society of Japan, No. 126.
are a few records of some pygidia provisionally identified to *Phillipisoma*\(^1\) (sens.\,ext.)
found in the Permian Maiya series of the southern Kitakami Mountainland and
the contemporaneous deposits of the Abukuma Mountainland. The palaeontological
and stratigraphical works by the former and present members of the Institute of
Geology and Palaeontology, Tōhoku Imperial University in the southern Kitakami
Mountainland, have recently greatly extended the geological distribution of trilobite,
and their remains are now known from at least four other different horizons,
Kawauti, Nakazato, Ōmori, and Tyōanzi series. In the upper part of the Ōmori
series trilobite-remains are particularly abundant and some of them are fairly well
preserved.

The present material was collected a few years ago by the senior author during
his field work in the southern Kitakami Mountainland, from the Nakazato series,
the precise locality being the south-west slope of Takainari-yama in the Kesen
district, Iwate-ken. It consists of an incomplete cephalon and a left eye both belong-
ing, without doubt, to the same species and bearing features the characteristic of
the genus *Phacops* (s. s.) which has been established by H. F. Emmrich\(^2\) in 1839
on *Phacops latifrons* Bronnianiart from the Devonian of Bohemia.

*Phacops* (s. s.) is a characteristic trilobite of the Devonian and upper Gota-
dian and more than 40 species have been recorded from the world, in so far as
known from the literature consulted. Many species of this genus are from Europe
and North America, while only a few being known from the southern hemisphere.
During the thirty years past, this genus has been repeatedly reviewed by F. R. C.
Reed\(^3\), R. Wedekind\(^9\), Rudolph and Emma Richter\(^5\), D. M. Delo\(^6\), and others,
and its generic status was made clear by the thorough revisions by Richter in
1926, Reed in 1927, and Delo in 1935. The Asiatic species of *Phacops* (s. s.)
are shown in the table 2.

As shown in the table 2, all the known species occur from the Devonian. The
Nakazato series from which the Japanese material now at hand has been derived
is also Devonian in age, and the occurrence of the genus in Japan is the first
record and is particularly interesting from the view of its geographical distribu-
tion in the world.

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Vol. II, No. 4, p. 113, 1933.
3) H. F. Emmrich: De Trilobitis. Dissertation Petrifacologia, 1839. (Cited after Riccin's Fossi-
lum Catalogus, Animalia, Trilobita, neodevonici, p. 75, 1928.)
4) F. R. C. Reed: Recent Work on the Phacopidae. Geol. Mag., Whole Ser., Vol. 64, pp. 308-
322, 1927.
336, 1911.
N. F. H., 99, pp. 126-211, 1926.
7) D. M. Delo: A Revision of the Phacopid Trilobites. Jour. Palaent., Vol. 9, No. 5, pp. 402-
423, 1935.
Table 2.

3. Phacops latifrons nov. var. Middle Devonian. Paduakpin, North Shan State, Burma.
5. Phacops latifrons BRONGNIART. Devonian. Iran (Persia).
7. Phacops altaicus TSCHERNYSCHEW. Upper part of Lower Devonian. South-western part of the Altai Mountainland.
9. Phacops fuscatus BARRANDE var. nov. Middle Devonian. Tangpingho Tsun, Linshan-hsien, Kuantung.

* Those marked with an asterisk are appeared in the cited publication, but were given no description or illustration.

Phacops (s. s.) sp. indet.

Text-figs. 1–3a

Cephalon very fragmental and strongly deformed, hemispherical? in general outline when restored, anterior margin arcuate and 25 mm high at the axial part of glabella.

Glabella imperfect, large, subpentagonal?, considerably inflated?, measuring 20 mm in maximum height, with a pair of very indistinct lateral furrows near base; whole surface tuberculated, tubercles become more or less larger in size toward front, rather uniformly distributed over whole surface, round or oval in general outline, 0.5–1 mm in diameter on an average. The one exceedingly large prominence on the left side of the frontal part of glabella is surely of accidental origin, and not a proper character.

Palpebral lobe on left side of cephalon preserved, considerably elevated and well marked from palpebrum. Eye large, prominent, inclined outward, hemispherical in outline, occupying nearly whole area of free cheek, 9 mm broad and 11 mm long; separated from glabella by a rather narrow but distinct furrow, composed of rounded lenses which are 0.5 mm in diameter on an average, arranged in 17 rows, 5–11 lenses being counted respectively in each row; the total number of them amount to 157; their arrangement and number of lenses in each row is as shown in the table 3 (counted from anterior side): Characters of racial sutures, genal angle, and neck ring quite unknown.

Table 3.

<table>
<thead>
<tr>
<th>Rows</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of lenses</td>
<td>8</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>10</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As stated above, the present material is characterised by having large schizochroal eyes, and tuberculated glabella with very indistinct lateral furrows; all these features are marked serving to remove its alliance from genera such as *Reedopsis*, *Eocryphops*, *Cryphops*, *Trimeroccephalus*, *Nephranops*, *Dianops*, *Bouleia* and others in the Phacopinae. In having large schizochroal eyes, it considerably approaches *Dalmanites*, but the latter has the glabella with distinct lateral furrows. Of the abundant species of *Phacops* (s. s.), *Phacops latifrons*, the type of the genus, bears many characters in common with the Japanese form, but the latter is easily distinguishable from the former by having a larger number of lenses in the eyes. In *latifrons*, the lenses are arranged in rows numbering up to 18, and amount in general to 77-90, at most 120 in the total number, while in the Japanese material there are 157 lenses arranged in 17 rows. In trilobites, however, the number of
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lenses in eyes is generally said to show a considerable variation in different individuals of the same species; especially it is far less in the young than in the adult. But as stated above, the difference recognizable in the number of lenses of eyes between the Japanese material and *latifrons* is too great to be look upon as mere variation within the same species. The former is therefore perhaps referable to a new form of *Phacops* (s. s.) closely allied to the latter. However, owing to the scanty and fragmental material, the erection of new specific name is at present avoided.


Finally, we wish to express our warmest thanks to Dr. H. Yabe, Prof. Em. of the Tōhoku Imperial University to whom we are much indebted in the preparation of this short paper and to Mr. K. Hatai of the Institute of Geology and Palaeontology, Tōhoku Imperial University for reading the manuscript.

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北上山地中里統（中部泥盆紀）産の*Phacops* (s. s.) に就いて（摘要）

杉山敏郎・岡野寛

本邦には三葉蟲類の尾部が北上及び阿武隈両山地の二叠紀から夫々知られ、大塚度義の *Phillipsia* に同定せられていた。最近紫外に石炭紀・泥盆紀及びゴトランド紀層から夫々発見されると云い至った。本報告では北上の中里統から産出した *Phacops* の尾部の記載をした。この標本は狭義の *Phacops* に同定され、特に *P. latifrons* に酷似する諸性質を帯びてゐる。この泥盆紀産の三葉蟲の報告は本邦では初めてである。