Communications

Trilobite Protaspids Showing Superfamily Differences

Fundamental differences of suprageneric nature are indicated in the structure of immature forms of the trilobites *Olenellus gilberti* Meek and *Antagmus* sp. from beds of Early Cambrian age and *Poliella denticulata* Rasetti from beds of early Middle Cambrian age in the Pioche district of Nevada. The three species are among the oldest known representatives, respectively, of the superfamilies Olenelloidae, Ptychoparioidae, and Corynexochoidae.

The structural differences of the immature forms are shown principally in the development of the glabella. In *Antagmus* sp. the glabella passes through three phases before reaching a condition comparable to that of the adult. In the youngest phase, the protaspid, the glabella is roughly T-shaped and it reaches to the anterior margin of the cephalon. The T-shape results from the nondifferentiation of the ocular lobe from the anterior part of the glabella. In the second phase, the earliest meraspid degrees, dorsal furrows outlining the anterior part of the glabella differentiate the glabella from the ocular lobes, but the glabella continues to extend to the anterior margin of the cephalon. In the third phase, later meraspid degrees, the frontal area appears and the glabella becomes progressively shorter until it reaches the adult condition. Similar developmental sequences are shown by Störmer [*Norsk Geol. Tidsskr.* **21**, pl. 1 (1942)] for *Blainia*(?) and *Olenus*.

In the protaspid of *Poliella denticulata* Rasetti the anterior portion of the glabella is already differentiated from the ocular lobes, comparable to phase two of the glabellar development of *Antagmus* sp.

In the protaspid of *O. gilberti* Meek the glabella and ocular lobes are differentiated and the frontal area is developed to a degree comparable to phase three of the glabellar development of *Antagmus* sp. The protaspid of *O. gilberti* Meek is therefore much more like the adult than the protaspids of *P. denticulata* Rasetti and *Antagmus* sp. Similar protaspids are illustrated by Störmer (*op. cit.*) for species of the olenellid genera *Elliptocephala* and *Paedumias*.

These observations indicate that there are recognizable differences among even the smallest fossilized remains of some of the earliest representatives of three groups of trilobites considered by most authors as superfamilies, and that these differences are shared by other trilobites placed in those superfamilies. The study of trilobite protaspids may be of fundamental importance to any future considerations of the basic principles of trilobite classification.

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Sclerotia in an Operculate Discomycete

True sclerotia have apparently never been reported in an operculate discomycete. Members of the genus *Wynnea,* however, produce an anomalous structure termed a sclerotium by some authors (*1, 2*). One of us (*3*) has referred to the structure in *Wynnea* as a "sclerotium," recognizing that it differs fundamentally from a true sclerotium in its internal structure. Recently the development of true sclerotia in an apparently undescribed species of *Pyronema* has been observed and is reported in this note.

Sclerotia, but no apothecia, were observed to develop on a coconut-milk medium supplemented with essential mineral elements and on a synthetic medium, Czapek's I (*4*). The latter medium has consistently yielded sclerotia in liquid and in 1.5 percent agar cultures. The sclerotia are spherical to irregular in shape, generally no larger than 1 mm in any dimension, and occur scattered over the surface of the medium. In cross section, the sclerotia are characterized by an outer rind of compacted, distorted, dark-colored cells and an inner, almost colorless medulla of thinner walled, less compacted pseudoparenchyma. The sclerotial anatomy is strikingly reminiscent of the kind found in certain members of the Sclerotiniaceae, a family of inoperculate discomycetes.

After surface sterilization of the sclerotia and transfer of them to sterile water agar (1.5 percent), mature apothecia, typical of the original *Pyronema* isolates, were produced. Single ascospores from these apothecia were transferred to the type of medium favoring sclerotial formation, and typical sclerotia were again produced. The fungus has been carried through a number of generations, from ascospores to sclerotia and back to ascospores, by repeating the foregoing techniques.

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Recent Progress in the Study of Pacific Coast Paleozoic Faunas

Exceptional advances in the study of Paleozoic rocks and fossils of the Far West have been made since 1943. From southern California to Oregon, detailed geologic mapping reveals new paleontologic data germane to a better understanding of Pacific Coast Paleozoic history.

Paleozoic rocks occupy great areas of California and Oregon in (i) the Mojave Desert, (ii) the Death Valley-Inyo region, (iii) the Sierra Nevada Mountains, (iv) the Klamath Mountains, and (v) the Upper Crooked River region of Oregon. In the Colorado Desert, Peninsular Ranges, Tehachapi Mountains, and the Coast Ranges, certain undated metamorphic rocks are also very probably Paleozoic age in part.

South of the great Garlock fault the pre-Tertiary rocks of the Mojave Desert and northern San Bernardino Mountains are prevailingly metamorphic and granitoid. This broad region embraces scattered areas of mildly altered or unaltered Paleozoic rocks bearing fossils of Cambrian, Carboniferous, and Permian ages. Within the Mojave region, however, Ordovician and Silurian rocks are yet unrecognized, and rocks of Devonian age occur only near the eastern margin.

Since 1943 the broad Death Valley-Inyo region, north of the Garlock fault, has yielded important additions to the Cordilleran Paleozoic faunas. With thickness of the order of 23,000 ft, the Paleozoic column here seemingly shows few major gaps between Lower Cambrian and upper Permian. Of particular interest are newly recognized faunas from Upper Ordovician, Silurian, Lower Devonian, Lower Mississippian, Pennsylvanian, and Permian rocks.

Studies of fusulinids from zoned Pennsylvanian and Permian sections in the Inyo Range have proved of local value in structural interpretation and may have broad stratigraphic application in the Great Basin, Sierran, and northern California regions. In general it may be said that the Death Valley-Inyo Paleozoic faunas indicate relationship to the central Great Basin column.

Comprehensive study of the very important Cambrian section in the northern Inyo Mountains (Waucoba area) has thus far not been carried to fruition. Interest in such undertaking, however, is now growing.

Mapping by U.S. Geological Survey parties in the Sierra Nevada belt, with emphasis upon search for mineral deposits, has recently brought to light new Paleozoic fossil occurrences of great interest. The newly discovered faunas are of Ordovician, Carboniferous, and Permian ages. Except for the Silurian strata long ago found at Taylorsville, Calif., the existence of middle Paleozoic strata in the Sierran belt is still in doubt. It is also not yet known with assurance whether the Sierran Paleozoic rocks bear closest faunal relationship to the Great Basin province or to the Klamath Mountains region.

In the Klamath Mountains of northern California, significant additions to Silurian, Devonian, Carboniferous, and Permian faunas have recently been made. Paleontologic investigations now in progress in the Redding district of northern California confirm the Devonian age of certain limestones and punky shales assigned to the Kennett formation. However, the relations of most faunas of the Kennett formation, particularly the coral assemblages originally assigned to Middle Devonian, still remain obscure.

The Mississippian units (Baird shale) of the Redding area carry the brachiopod *Gigantoproductus*; they correlate with the *Gigantoproductus-Striatifera* fauna of Old World affinities as found in the Coffee Creek formation of Oregon [C. W. Merriam and S. A. Berthiaume, *Geol. Soc. Amer. Bull.* **51,** 1935 (1940)]. Comparison of coral and fusulinid assemblages from the Permian (?) McCloud limestone and the Nosoni formation of Permian age at Redding with those of the eastern Oregon, Sierran, and Death Valley-Inyo areas, may also be expected to yield data of paleogeographic interest.

Fossil faunas now under investigation from several localities in the northern Klamath Mountains provide evidence of widespread and varied Silurian deposition in this portion of the Pacific Coastal belt. No direct relationship to known Silurian faunas of the Great Basin is so far indicated by provisional studies of the Klamath Silurian rocks.

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New High-Pressure Phases of Silica

L. Coes [*Science* **118,** 131 (1953)] has described a new high-pressure crystalline phase of silica, produced at 35,000 atm and 500 to 800°C. Paul P. Keat, graduate student in the School of Ceramics at Rutgers University, has recently discovered another crystalline phase of silica, produced hydrothermally above the critical point of water, under certain conditions of chemical environment. Information on this phase will probably be published within the next few months.

Each of the new phases of silica has a distinctive structure, making it quite different from the well-known crystalline phases, quartz, tridymite, and cristobalite.

Fearing that the discoverers might be too modest to name the new phases after themselves, I have sought and obtained permission from Coes and Keat, both of whom are now at the Research Laboratories of the Norton Company in Worcester, Mass., to propose names for the new phases—namely, *coesite* for the phase produced at 35,000 atm, and *keatite* for the phase produced hydrothermally. W. T. Schaller, of the U.S. Geological Survey, has been kind enough to check his collection of lists of new mineral names and tells me that these two names have not been previously used for any mineral.

Schaller took occasion to register his objection to the use of the suffix *-ite* on the ground that it is an established custom to give this termination only to names of natural minerals. Without attempting to pass on the merits of this principle, I would only remark that it is very convenient to have a single word by which to refer to a new substance or a new phase of an old substance, and that metallurgists and chemists have long been accustomed to name products after the discoverer or some other individual by the use of the termination *-ite*. I need only refer to austenite and