considering it Permian and others Pennsylvanian (Upper Carboniferous). Most published opinion at present favors a Pennsylvanian age.

The presence of *Omphalotrochus* in the *Uddenites* zone, below *Pseudoschwagerina*, suggests that the range of the genus is similar in Russia and west Texas. According to last-known stratigraphic assignments of the Russian type Permian section (*1*), *Omphalotrochus* is not a "guide fossil" to the Permian but would rather be indicative of late Carboniferous age. If the *Uddenites* zone is considered Permian, then the Moscow basin is the only area where *Omphalotrochus* occurs below rocks that a large group of geologists classify as basal Permian. An alternative is to consider the *Omphalotrochus* zone as a faunal facies of the lower part of the *Pseudoschwagerina* zone—essentially what Knight suggested.

Within the United States, *Omphalotrochus* is known from California, Nevada, Wyoming, Arizona, New Mexico, west Texas, north-central Texas, and Kansas. It ranges from the *Uddenites* zone to Permian beds, correlated with the Leonard formation, above the Wolfcamp. My study suggests that there are more than the two species now described from North America. Discrimination of these several species may show that they have value for regional correlation. *Omphalotrochus ferrieri* Girty and *Omphalotrochus conoideus* Girty, described from the Phosphoria formation, probably should be referred to another genus.

The geographic distribution of species of this genus needs further study. For example, *O. whitneyi* (Meek) from California (McCloud limestone-Permian?) may occur in west Texas. A specimen similar to *O. whitneyi* has been illustrated from the Donetz basin, and the species has been reported from the Timan area (*3*). If these and the American form are conspecific, this species ranges from latitude 65°N to 32°N.

Omphalotrochus obtusispira (Shumard), from west Texas (Hueco limestone-Permian?) has been reported from Peru (*4*). A remarkably similar species, *O. gerthi* Wanner, has been named from Indonesia (*5*). Insofar as one can tell from illustrations, these two named species could be conspecific. If this is so, the species has a geographic range not only from 32°N latitude to 15°S latitude, but also halfway around the world.

These afore-mentioned ranges are remarkable for any benthonic animal, living or fossil. If the possible identity of species and their distributions mentioned are substantiated, they will support the idea of widely uniform climatic conditions and interconnected shallow migration routes during late Paleozoic time.

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References and Notes

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An Ultra-Fine-Grained Light-Sensitive Film of Optional Density

The following technique has been developed by the writer to produce an extremely dense and fine-grained light-sensitive dispersion of a silver halide that responds to development and fixing—although, as might be expected, the light sensitivity is not great.

A layer of collodion is spread upon a sheet of glass and stripped off after drying. This film is floated, with the assistance of a support, on the surface of a solution containing either the halide or the silver salt, while the solution containing the other ion is carefully poured on top of the film.

Since the diffusion rate through the film is proportional to the concentration, a precipitate of silver halide coats the side of the film opposite the solution that is too concentrated. By altering the concentration of one solution, however, a colloidal deposit forms within the body of the film itself and, if time enough is allowed, almost any desired density may be attained. The grain is so fine that it selectively scatters blue light and is not resolved by an ordinary microscope.

It would seem that a medium with these properties could be put to many interesting uses. It should prove expedient for constructing reticules and diffraction gratings photographically and for other applications requiring photographic miniaturization.

An interesting observation made during these experiments is that if the collodion is poured directly onto an aqueous surface and allowed to spread into a film, a molecular orientation apparently takes place at the interface which renders the film impermeable to the diffusion of ions.

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