report will be prepared on reptiles of the Big Bend region, under Mr. Schmidt's direction.

GERALD FITZGERALD and J. B. Mertie, Jr., of the U. S. Geological Survey, who will make topographic surveys and geologic investigations in the Goodnews Bay district and adjacent parts of southwestern Alaska where there have been recent discoveries of platinum-bearing deposits, and T. W. Ranta, who will make topographic surveys in the Alaska Range region at the head of Copper River, are now on their way to the Territory.

THE Executive Committee of the American Association of Anatomists has voted to hold the next annual meeting at the School of Medicine of the University of Pittsburgh on April 14, 15 and 16, 1938.

IT has been decided by the Royal College of Surgeons of England that under the Moynihan bequest not less than three, or more than five, lectures on the results of research in its application to surgery shall be given in alternate years by a lecturer who shall be styled the Moynihan lecturer.

IT is planned to amalgamate the Institute of Hygiene, London, with the Royal Institute of Public Health. They will in future be known as the Royal Institute of Public Health and Hygiene.

WILLIAM BINGHAM, 2D, of Boston, has given $300,000 to the Boston Dispensary to complete the building of its Diagnostic Hospital and to finance its operation. The donation, supplementing a previous gift of $400,000 made by him in April, will be devoted to the creation of a medical center for the rural physicians of New England, which will be the only one of its kind. The object of the gift is "to make it possible for patients needing diagnosis, patients from any corner of New England and from any economic group to get the latest medical advice and for the country doctor to profit from the knowledge and experience of specialists."

A SEISMOLOGICAL observatory has been established at the University of Queensland in Brisbane. Hitherto there has been no such observatory in Australia north of Sydney. The station has provided a missing link in the chain of seismological observatories in Sydney, Melbourne, Adelaide and Perth. According to *The Courier-Mail* "interest in the creation of a seismological station at Queensland was first aroused as a result of the earth tremor at Gayndah in April, 1935. The first practical move was made anonymously in that year by a former student of the department of geology in the early days of the university. His offer to provide a Milne-Shaw seismograph was accepted with enthusiasm. Later, when it was considered desirable to have an additional instrument, so that the Northern-Southern component might be determined, as well as the Eastern-Western one, the Council for Scientific and Industrial Research provided the second machine last year."

ACCORDING to *Nature* the Kyoto Imperial University has accepted a donation equivalent to about $50,000 from the Osaka Electric Railway Company towards the building of an observatory on the southern peak of Ikomasan at a height of 640 meters. The observatory will include a main building with a 9-meter dome, a solar laboratory, housing for a reflector and a dormitory. The equipment of the solar department of the Kwasan Observatory will be transferred to the new site, in addition to other instruments including the 80-cm. Tomkins reflector. Later a museum devoted to astronomical exhibits and those of allied sciences will be built near the Ikomasan Observatory. Professor Yamamoto will be the director of the group. The Kwasan Observatory will then become a purely academic institution.

DISCUSSION

SPORES OF CAMBRIAN PLANTS

THE recent discoveries of Silurian land plants in association with the graptolite genus *Monograptus* in Victoria, Australia, by Lang and Cookson[1] have extended our knowledge of a terrestrial flora antedating by millions of years the celebrated Devonian Rhynia flora.

There are among rocks of Lower Paleozoic age a number of carbonaceous sediments which presumably are composed largely of plant debris. Kuckersite is a boghead from the Ordovician of Esthonia that Zalessky[2] has described as consisting almost exclusively of *Gleocapsa*-like unicellular algae.

[1] *Phil. Trans. Roy. Soc. Lond.*, B., 224: 421–449, 1935.
[2] *Ann. Soc. Pal. Russ.*, 25, 1917.

Professor A. C. Lane and Professor E. C. Jeffrey have given me specimens of the Upper Cambrian "Kolm" or "Swedish oil shale." This sediment from the district of Ost-Gotland is rather peculiar among oil shales. The color is black, the luster dull (rarely resinous in small areas on the surface) and the fracture cubic or conchoidal. The black shale gives little indication of distortion. It occurs in lenses of variable dimensions.

With the aid of a surface maceration treatment with Schultz's mixture and subsequent neutralization with ammonium hydroxide, it has been possible to obtain serial nitrocellulose peels, both vertically and transversely, through the samples.

Several scores of well-preserved, small, spherical spores have been found in the ground-mass of finely divided "black" debris. It is this spore content which arrests our attention.

The spores bear the typical triradiate scar characteristic of pteridophytes. The spores vary in diameter from 65 to 75 micra. Although the color of the boghead is dark brown to "black," bleaching with chlorine or oxygen readily restores a bright yellow resinous color.

Similar spores are abundant in Upper and Middle Paleozoic rocks. Perhaps the most celebrated are those of *Sporocarpon furcatum* Dawson (*Foerstia ohioensis* White and Stadnichenko). In this plant, beautifully preserved tetrads are present in practically all specimens which I have studied. White and Stadnichenko[3] and Kidston and Lang[4] have published excellent figures of the tetrads.

Sporocarpon furcatum is generally considered as an alga,[5] because the thalloid body so far as known consists of small, simple, terminal dichotomously forked branches, occasionally circinnately coiled. In answer to letters of inquiry, both Professor Pia, of Vienna, and Professor Kräusel, of Frankfort-am-Main, the leading investigators of Paleozoic algae, say that they have not seen specimens. Kidston and Lang suggest that the spores are "resistant" and cutinized, and thereby avoid a dogmatic interpretation of systematic position. However, the thallus-like terminal branches are lignitized, as can be readily demonstrated by their dissolution with nitric acid and strong alkali. No algae are known to bear cutinized or resistant spores with the tetrad triradiate scar.

Thus we reach the inevitable choice between two possibilities: either the Cambrian spores from Swedish oil shale are those of terrestrial plants which had attained the pteridophytic level of development or they represent algal-like plants which progressed far along the direction towards the production of resistant spores. It is in this latter light that Kidston and Lang have viewed *Sporocarpon*.

It is not possible that the Cambrian spores from Sweden are related to any of the several species of *Pachytheca*. *Pachytheca*[6] is a genus of Silurian and Devonian calcareous organisms presumably algal in nature. These fossils are megascopic in size and have, at times, been considered to be calcitized eggs of trilobites. There is present, in well-preserved specimens, a large central cavity surrounded by a zone of radiating tubes, some of which are branched. No spores of *Pachytheca* are known. Some investigators[7] have called attention to the possibility that *Pachytheca* itself may be the fructification of a *Nematophyton*-like plant.

The Cambrian spores, for which no name is here proposed, are quite different from any other known Paleozoic spores. They conform most closely to those of the Psilophytales in size, lack of ornamentation and the proportionately large triradiate scar.

The boghead coals are conventionally interpreted as algal sapropelic carbonaceous sediments. The celebrated Permian boghead from Autun in France is variously considered to be algal, spore or even sphaerulitic. A boghead is a sediment which has the physical characteristics of a cannel coal but with a high "kerosene" content. It can be ignited with the flame of a match and yield the familiar odors of burning petroleum. The evidences upon which the algal opinion is based are not convincing. Even Zalessky's figures of Kuckersite are not persuasive.

The Swedish Kolm has the general appearance of a Carboniferous cannel coal. True cannels are composed chiefly of cutinized spores of various pteridophytes. The Cambrian age of the Swedish oil shale is not disputed by geologists. It is found in the Upper Cambrian with a characteristic trilobite fauna.[8] The sediment is properly termed a boghead, although specimens shrink and crack only slightly upon exposure to air. The shrinkage usually observed in fresh specimens of bogheads is due to the evaporation of volatile ingredients.

The chief interest in these early plant structures centers in their remote geological age. They are, as far as I have been able to ascertain, not only the oldest recognized spores but also are intriguingly suggestive of the antiquity of the tendency toward the attainment of the land-habit.

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[3] *Econ. Geol.*, 18: 238–252, 1923.
[4] *Trans. Roy. Soc. Edinb.*, 53: 597–601, 1924.
[5] M. Hirmer, "Handbuch d. Palaobotanik," 1: 109, 1927.
[6] P. E. Raymond, *Bull. Mus. Comp. Zool.*, 55: 165–171, 1931.

A LAWN MARVEL

THE slime-moulds are probably survivors of that period in the history of life on the planet when the distinction between animals and plants had not yet been established. (To be sure, it is not clear even now.) They have animal affinities—amoeboid movement—in the vegetative stage and plant affinities—spore formation—in the reproductive stage. They creep about in rich soil, under leaves and in the spaces in rotten wood in search of food, but when growth is

[7] See D. H. Scott, "Paleobotany" in Encyclopedia Britannica, 11th ed.
[8] *Olenus* zone; *Peltura* sub-zone.