ACTA PALAEOBOTANICA
XX (2): 123—128, 1979

TERESA MARCINKIEWICZ

FUNGI-LIKE FORMS ON JURASSIC MEGASPORES

Utwory grzybopodobne na megasporach jurajskich

ABSTRACT. The present paper concerns organisms morphologically similar to the genus *Annella*, attributed to the fungi by Srivastava (1976). The presence of these organisms in the form of fungal hyphae and small spherical bodies of various type was discovered on the exine surface of megaspores *Trileites murrayi* (Harris) Marcinkiewicz, found in the Middle Jurassic of Grojec near Cracow. The species *A. pulchra* is reported and one new species, *Reymanella globosa* sp. nov., belonging to the new genus *Reymanella*, is described.

INTRODUCTION

Many papers have recently been published concerning microbial organisms activity and various forms of degradation in recent pollen (Goldstein 1960; Skvarla & Anderegg 1972) as well as in pollen grains and microspores from Paleozoic, Mesozoic and Tertiary sediments (Moore 1963; Elsik 1966, 1968; Srivastava 1976).

Signs of their activity are usually connected with *Actinomycetales* bacteria or aquatic fungi (*Phycomycetes*), particularly with *Chytridiales* and *Blastocladiales* whose representatives parasitize or live as saprophytic forms and absorb food from the host's cell by rhizoids.

In the literature, with the exception of Renault (1900), who „described the presence of the saprophytic fungus *Anthracomyces cannalensis* on the surfaces of micro- and megaspores" (fide Moore 1963, p. 350), the fungi have not been reported to occur on fossil megaspores.

The subject of the present paper is the description of optical and electron photomicrographs showing the occurrence of fungi on megaspores found in the Jurassic clays of Grojec.

DESCRIPTION OF FUNGI-LIKE FORMS

During the study of megaspores from Middle Jurassic Grojec clays the author found numerous specimens of megaspores with single spherules or larger clusters attached to the smooth and lustrous exine surface. The investigated

spores have morphological characteristics in common with those of the species *Trileites murrayi* (Harris) Marcinkiewicz, the only difference being the presence of yellow-red spherules similar to the sculpture of exine of the verrucae type.

Further minute examination of various fragments of the exine megaspore proved that individual spherules appearing on their surface are not elements of the sculpture. The result of these observations also led to the conclusion that the shape of spherules and their manner of distribution and attachment to the spore exine indicates saprophytic organisms. This type of spherules resembles most closely the spherical bodies of the genus *Annella* classified as a fungus by Srivastava (1976). He reported the presence of spherules *Annella capitata* Srivastava and *A. pulchra* Srivastava attached to the exine surface of some smooth spores and pollen grains from the Jurassic sediments of England as well as on the surface of various fragments of wood.

The organisms studied here were classified on the basis of diverse morphological features as the species *Annella pulchra* Srivastava and as a new genus and species *Reymanella globosa* gen. et sp. nov.

It should also be noted that fossil megaspores with several, red, translucent globules had already been recovered from Wealden and Senonian rocks in Netherlands. Dijkstra (1949, 1961) has described them as *Triletes carbunculus* Dijkstra (reclassified by Potonié 1956 as *Verrutriletes*) and *Triletes imitatus* Dijkstra. Others which should be mentioned are, megaspores from the Bajocian in Poland, described by Marcinkiewicz (1962) as *Verrutriletes pseudosquamosus* which are characterized by the occurrence on their smooth surface of „somewhat transparent discs" and as *Verrutriletes* sp., with individual red globules. After analysing the shape and manner distribution of these supposed elements of sculpture it may be stated that both „globules" and „discs" are not elements of sculpture but probably the effect of the action of saprophytic fungi. In order to confirm this supposition we should have more accurate knowledge to be gained by high magnification under the scanning electron microscope is essential.

DESCRIPTION OF SPECIES

Fungi incertae sedis

Genus ***Annella*** Srivastava 1976

Annella pulchra Srivastava

Pl. VIII, figs. 1a, 1b

1976 *Annella pulchra* Srivastava; Srivastava, p. 98, Pl. 1, figs. 12–14, Pl. 2, figs. 1, 2.

Description. Angular or polygonal spherules, smooth, 1 μm to 2·5 μm

in diameter. Some spherules are constricted at their bases to form a neck; they may occur individually or in a linear arrangement usually containing up to five closely clustered spherules. Hyphae are tubular, some of them beaded: length from 7·5 μm to 12·5 μm, width from 1 μm to 2 μm.

Occurrence. Poland: Grojec clays (Bathonian stage) *; England (Oxfordian stage).

Genus *Reymanella* g. nov.

Type species. *Reymanella globosa* sp. nov.

Description. Single spherules of various size with a few neck-like appendages at the base.

Derivatio nominis. Named after the Polish palaeobotanist — dr. Maria Reymanówna.

Comparison. This genus differs considerably from *Annella* Srivastava (1976) in being much barger and having two or three neck-like appendages at the base.

Reymanella globosa sp. nov.

Pl. I, figs. 1–4; Pl. II, figs. 1–4; Pl. III, figs. 1–3; Pl. IV, fig. 1; Pl. V, figs. 1, 2; Pl. VI, figs. 1, 2; Pl. VII, figs. 1, 2

Holotypus. Pl. VII, fig. 1

Fungal elements are developed as smooth spherules attached to the exine surface of the megaspore *Trileites murrayi* (Harris) Marcinkiewicz.

Specimens are deposited in paleobotanical collection of the Geological Institute, Warsaw.

Locus typicus. Grojec near Cracow, Poland.

Stratum typicum. Grojec clays (Bathonian).

Derivatio nominis. Globosa (Latin) — spherical.

Description. Shape of spherules spherical or oval, from a few to 80 μm (100 μm) in diameter; surface completely smooth and lustrous, sometimes lustreless and rough, colour yellow — red or ruby, sometimes almost black. Spherules occur individually or are closely clustered in groups; they are constricted at the base to form a neck or have two or three short neck-like appendages by which they are attached to the megaspore.

Occurrence. Poland: Grojec clays (Bathonian stage).

---

* Age of the Grojec clays according to Marcinkiewicz (in press).

ACKNOWLEDGMENTS

The author wishes to express warm thanks to Dr. M. Reymanówna from the Institute of Botany of the Polish Academy of Sciences in Cracow for putting samples of the Grojec clays at the author's disposal. The author is also deeply indebted to Professor W. G. Chaloner of Birkbeck College in London who has made it possible to take SEM photomicrographs without which the observations given in the present paper would not have been possible. The optical photographs of megaspores were taken by Mrs. D. Oleksiak in the Photographic Laboratory of the Geological Institute in Warsaw.

Geological Institute, Department of Stratigraphy, Tectonics and Palaeogeography, ul. Rakowiecka 4, 00-975 Warszawa,
Instytut Geologiczny, Zakład Stratygrafii, Tektoniki i Paleogeografii

REFERENCES

Dijkstra S. J. 1949. Megaspores and some other fossils from the Aechenian (Senonian) in South Limburg, Netherlands. Meded. Geol. Sticht. N. S., 3: 19–32.

— 1961. On Megaspores, *Charophyta* fruits and some other small fossils from the Cretaceous. Palaeobotanist, 8 (1, 2): 8–18.

Elsik W. C. 1966. Biologic degradation of fossil pollen grains and spores. Micropaleontol., 12 (4): 515–518.

— 1968. Palynology of a Paleocene Rockdale lignite, Milam County, Texas. 1. Morphology and taxonomy. Pollen et Spores, 10 (2): 263–314.

Goldstein S. 1960. Degradation of pollen by *Phycomycetes*. Ecology, 41 (3): 543—545.

Harris T. M. 1961. The Yorkshire Jurassic Flora, I. *Thallophyta-Pteridophyta*. Brit. Mus. (Nat. Hist.), London.

Marcinkiewicz T. 1962. Megaspory retyku i liasu z wiercenia Mechowo koło Kamienia Pomorskiego i ich wartość stratygraficzna (summary: Rhaetian and Lias megaspores from borehole Mechowo near Kamień Pomorski and their stratigraphical value). Prace Inst. Geol., 30 (3): 469–493.

— 1971. Stratygrafia retyku i liasu w Polsce na podstawie badań megasporowych (summary: The stratigraphy of the Rhaetian and Lias in Poland based on megaspore investigations). Prace Inst. Geol., 65: 3–57.

— (in press). The Jurassic megaspores from Grojec clays near Cracow. Acta Palaeob., 21.

Moore L. R. 1963. Microbiological colonization and attack on some Carboniferous miospores. Palaeontology, 6 (2): 349–372.

Skvarla J. J. & Anderegg D. E. 1972. Infestation of cedar pollen by *Rhizophidium* (*Chytridiomycetes*). Grana, 12 (1): 47–51.

Srivastava S. K. 1976. Biogenic infection in Jurassic spores and pollen. Geoscience and Man, 15: 95–100.

STRESZCZENIE

UTWORY GRZYBOPODOBNE NA MEGASPORACH JURAJSKICH

W czasie badań nad megasporami, pochodzącymi ze środkowojurajskich glinek ogniotrwałych w Grojcu koło Krakowa, znaleziono liczne okazy gatunku *Trileites murrayi* (Harris) Marcinkiewicz, u których na powierzchni zaobserwo-

wano obecność kuleczek barwy żółtoczerwonej. Bezładne rozprzestrzenienie ich oraz sposób przyczepienia do powierzchni egzyny za pomocą wyrostków wskazuje na obecność form podobnych do grzybów, zbliżonych do rodzaju *Annella* (Srivastava 1976). Ze względu jednak na różnorodny kształt i wielkość oraz sposób przyczepienia kuleczek do egzyny spory, wyróżniono nowy rodzaj *Reymanella* i dwa gatunki: *Annella pulchra* Srivastava i *Reymanella globosa* sp. nov.

Plate I

Reymanella globosa n. sp. on *Trileites murrayi* (Harris) Marcinkiewicz

1. Arrows point single spherules attached to proximal surface of the spore in reflected light; IG. 590 (8) 77 M, × 70
2. A few spherules on proximal surface of the spore in transmitted light; IG. 590 (a–1) 77 Mp, × 100

3a. Proximal surface. Spherules attached to tetrad marks

3b. Same specimen. Distal surface in reflected light; IG. 590 (9) 77 M, × 70

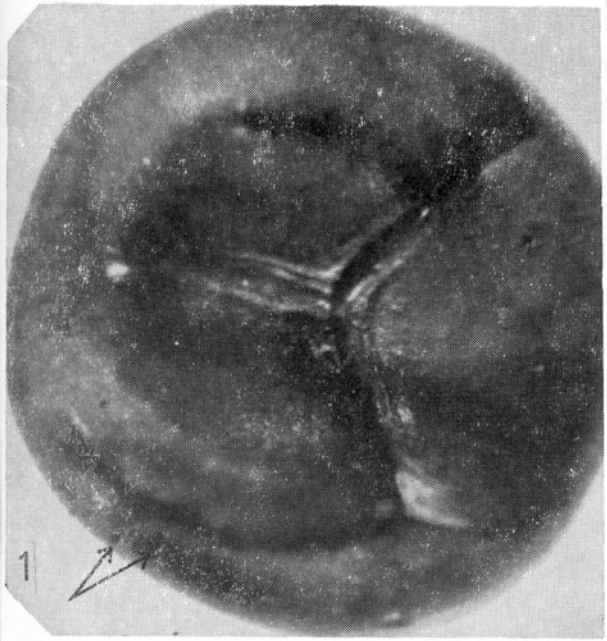
4. Numerous spherules attached to proximal surface of the spore in transmitted light; IG 590 (a–3) 77 Mp, × 75

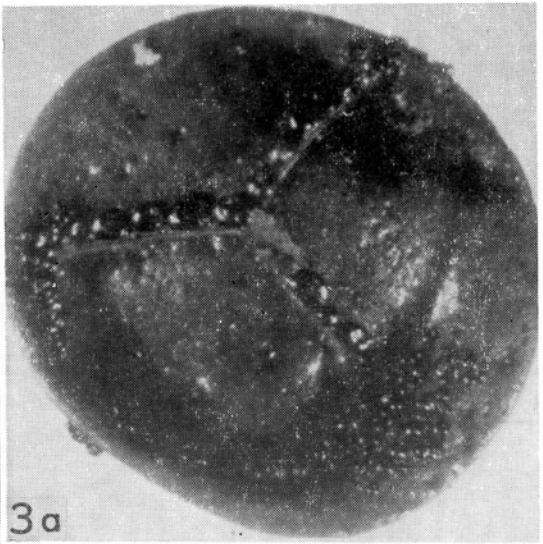
ERRATA

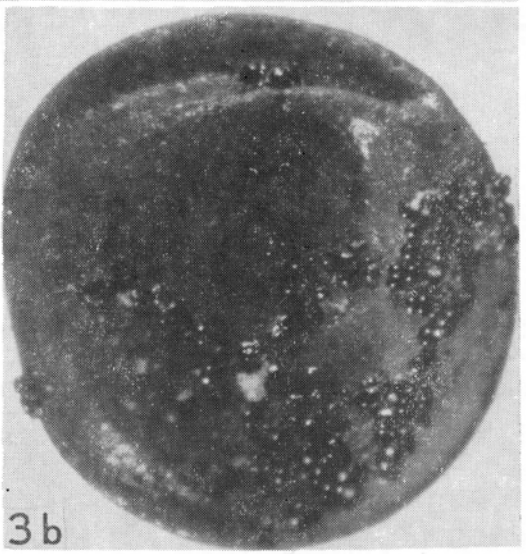
Tablice I - VIII dotyczące artykułu Teresy Marcinkiewicz „Fungi-like forms on Jurassic megaspores" zostały omyłkowo zamieszczone po artykule B. D. Sharmy (po s. 136). Właściwe miejsce tych tablic jest po s. 128.

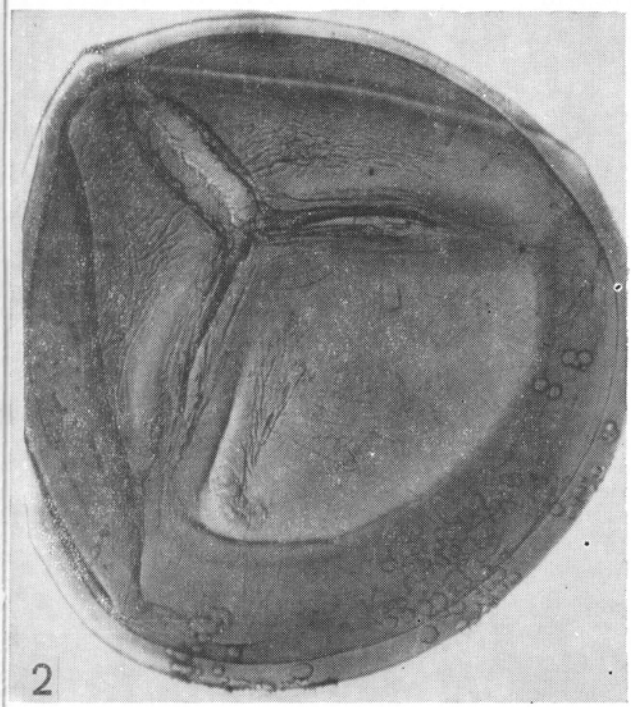
ERRATUM

Plates I - VIII concerning the article by Teresa Marcinkiewicz „Fungi-like forms on Jurassic megaspores" were mistakenly placed next to the article by B. D. Sharma (following p. 136). Their proper place is next to p. 128.


1


3a


3b


2

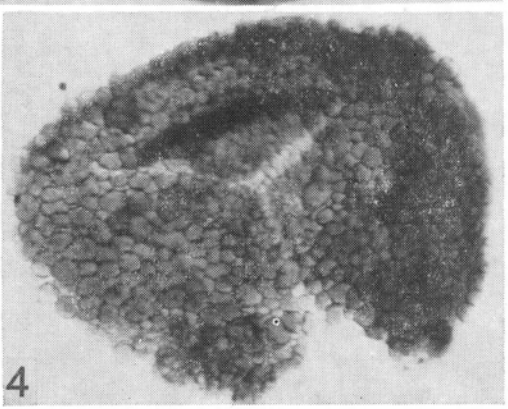
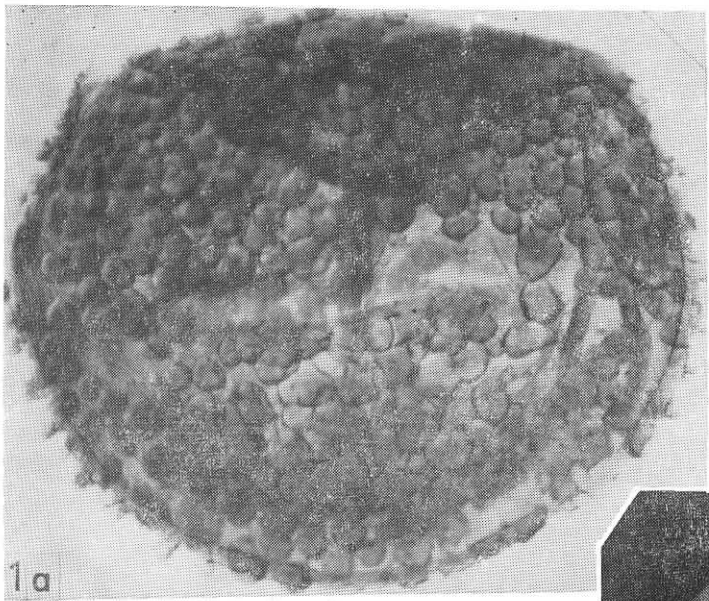

4

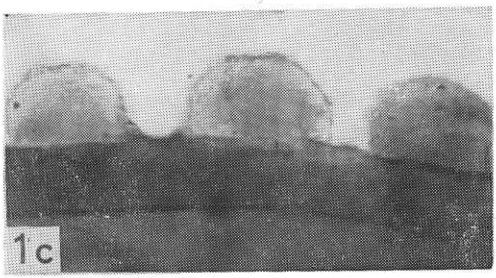
Plate II

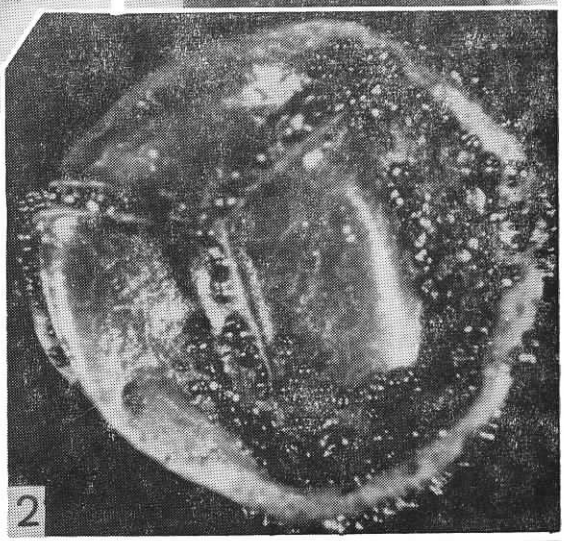
Trileites murrayi (Harris) Marcinkiewicz with spherules of *Reymanella globosa* n. sp.

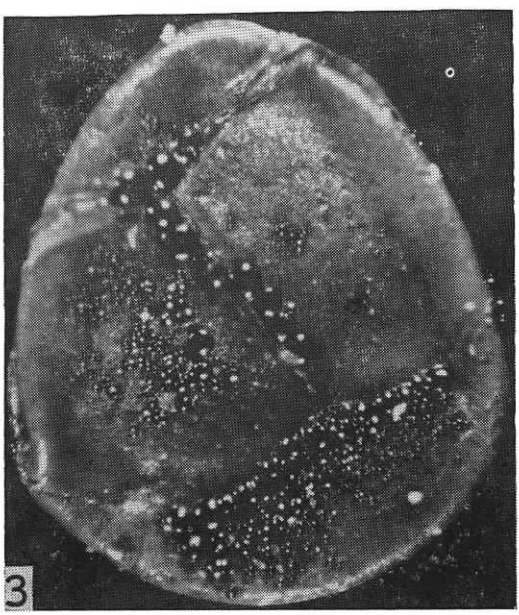
1a. Specimen with numerous spherules in transmitted light; IG. 590 (a–4) 77 Mp, × 75
1b, 1c. Same specimen. Side view of spherules in transmitted light, × 300
2, 3, 4. Specimens with clusters of spherules in reflected light; × 75; 2 — IG. 590 (13) 77 M; 3 — IG. 590 (12) 77 M; 4 — IG. 590 (10) 77 M


1a


1b


1c


2


3

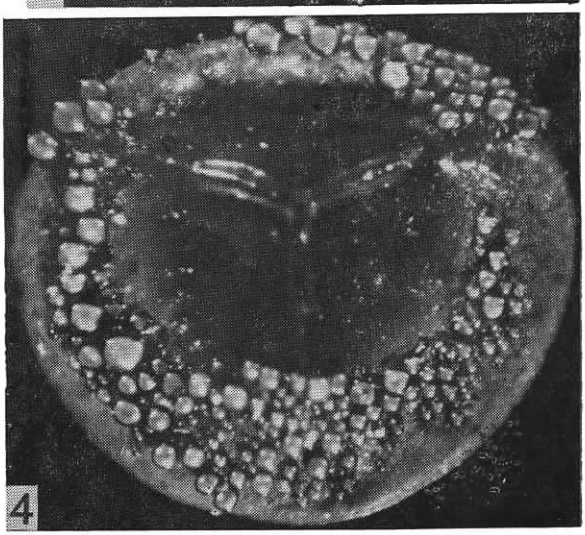
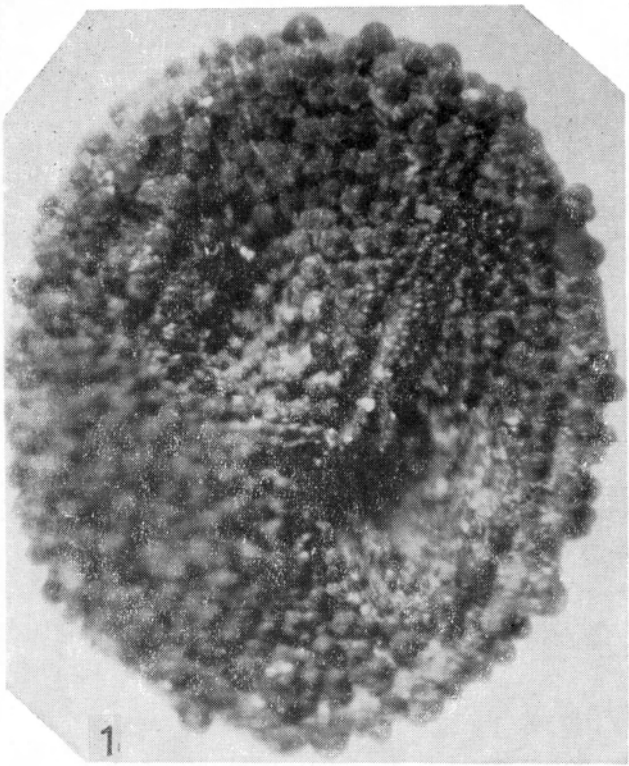

4

Plate III

Trileites murrayi (Harris) Marcinkiewicz with spherules of *Reymanella globosa* n. sp.

1. Specimen with numerous, rough spherules attached to the whole surface of spore together with tetrad marks in reflected light; IG. 590 (14) 77 M, × 70
2. Specimen with clusters of spherules in transmitted light; IG. 590 (a–7) 77 Mp, × 75
3. Specimen with clusters of spherules in scanning electron microscope; × 100


1


2

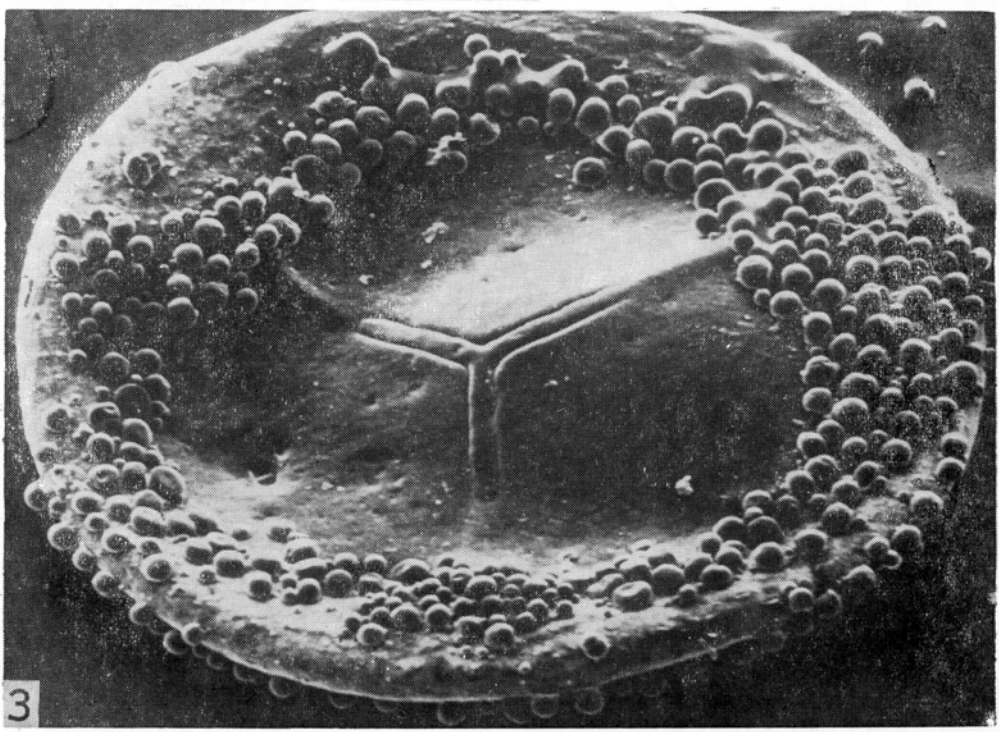
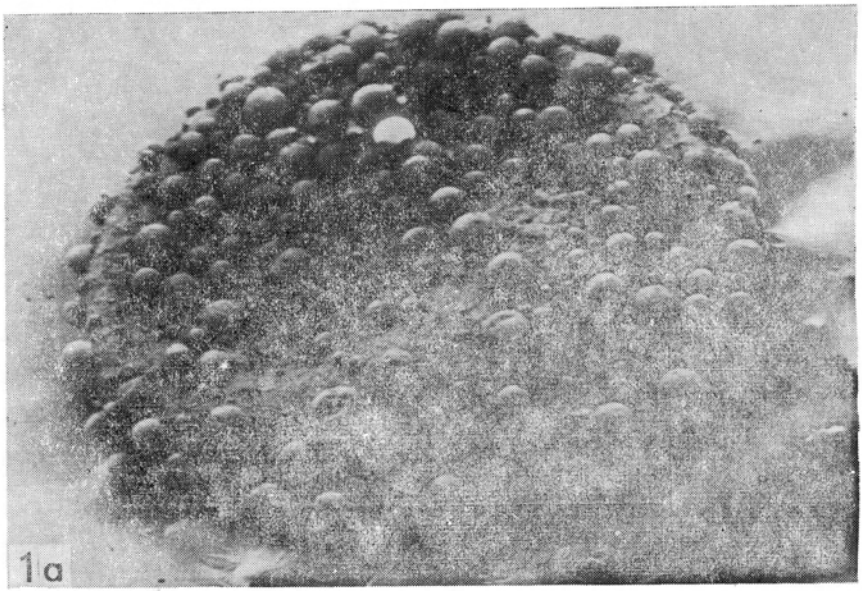

3

Plate IV

1a. *Trileites murrayi* (Harris) Marcinkiewicz. Distal surface with numerous spherules *Reymanella globosa* n. sp. in scanning electron microscope; × 70

1b. Same specimen. Fragment of distal surface with spherules in scanning electron microscope; × 125


1a

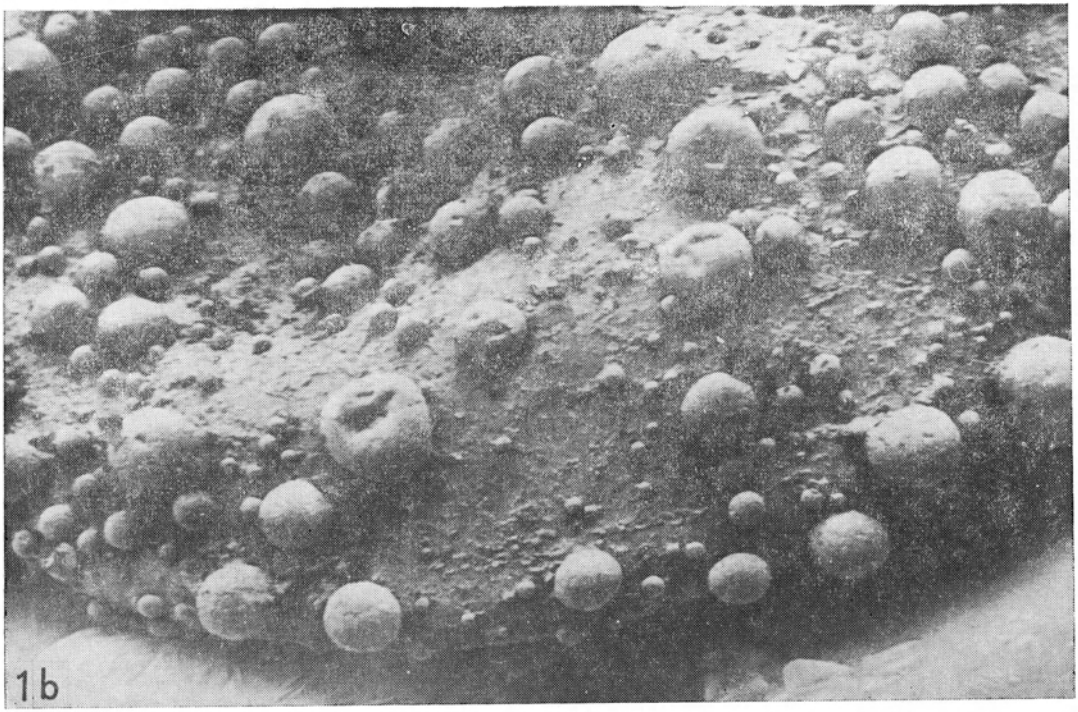
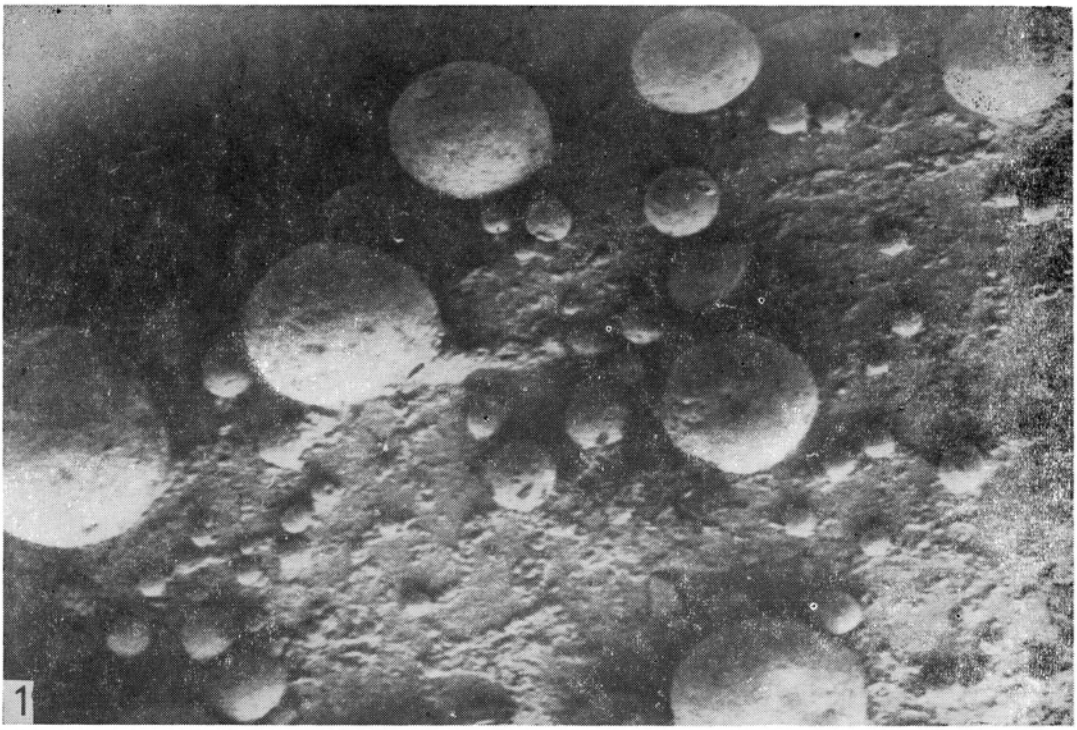

1b

Plate V

Reymanella globosa n. sp. on *Trileites murrayi* (Harris) Marcinkiewicz (scanning electron microscope)

1. Spherules on distal surface of spore, × 250
2. Spherules on other part of spore. Photomicrograph shows the shape of spherules and manner of their attachment to the exine surface of spore; × 1000


1

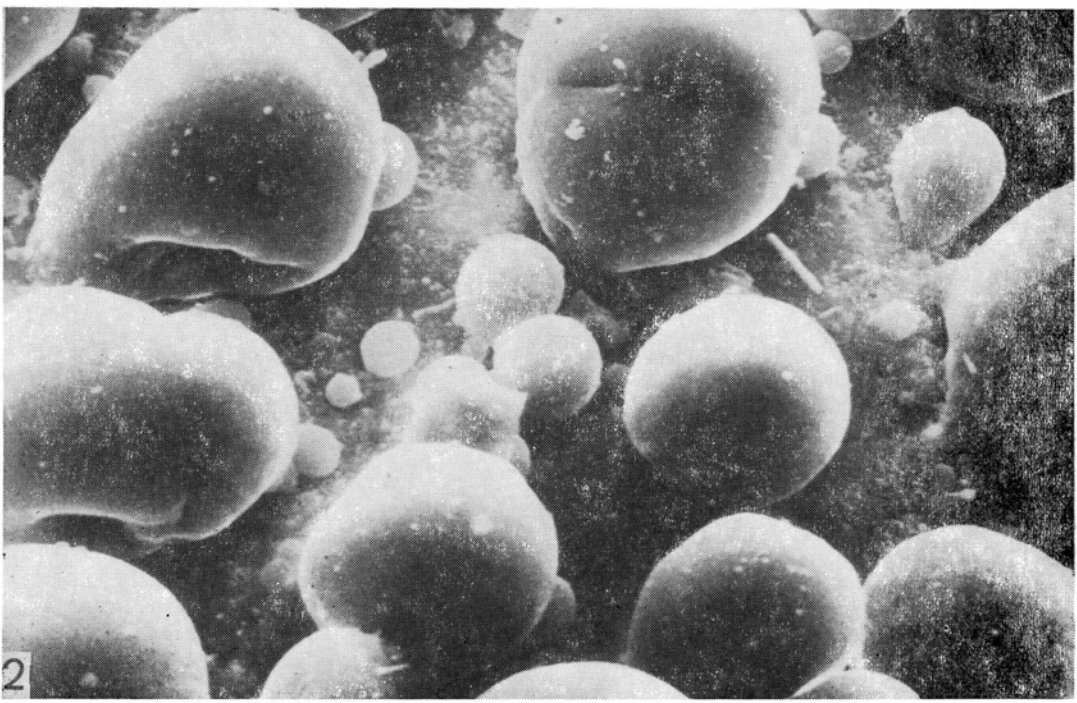
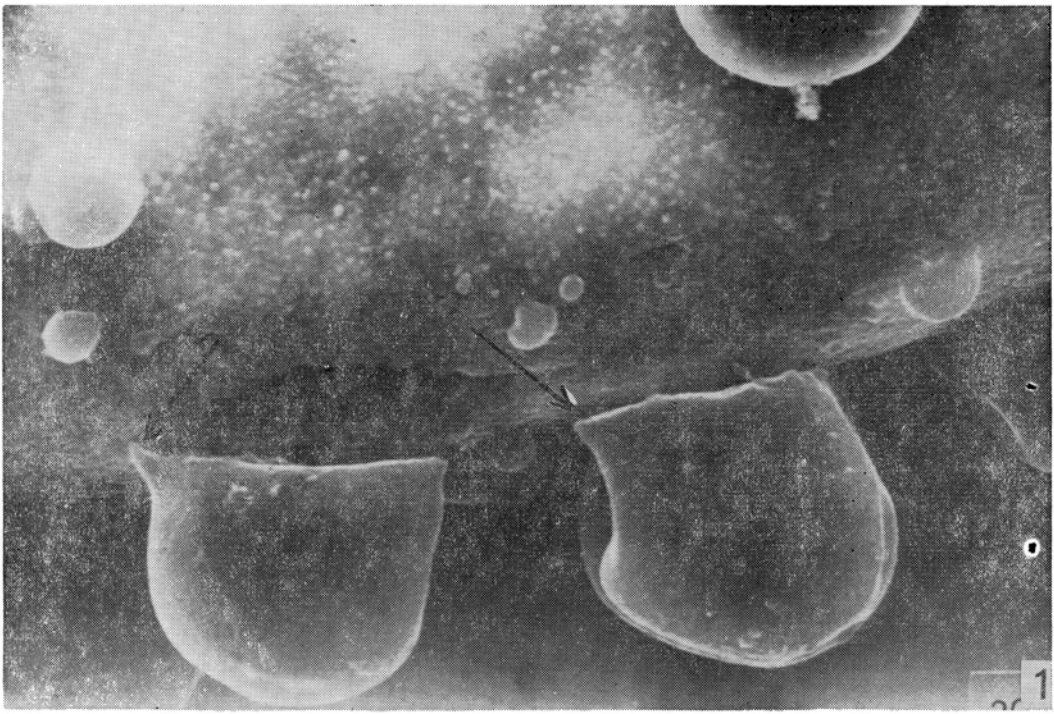
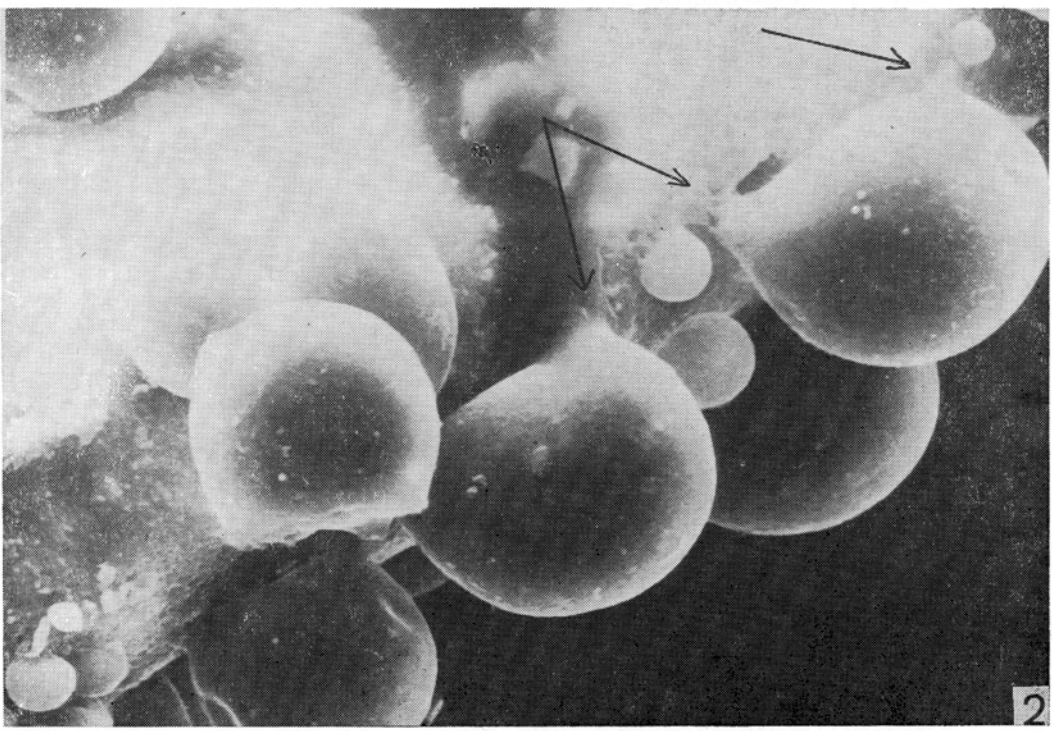

2

Plate VI

1, 2. *Reymanella globosa* n. sp. on other part of spore *Trileites murrayi* (Harris) Marcinkiewicz in scanning electron microscope. Photomicrographs show the shape of spherules and the mode of their attachment with the help of neck-like appendages to the exine surface of the spore; × 1000





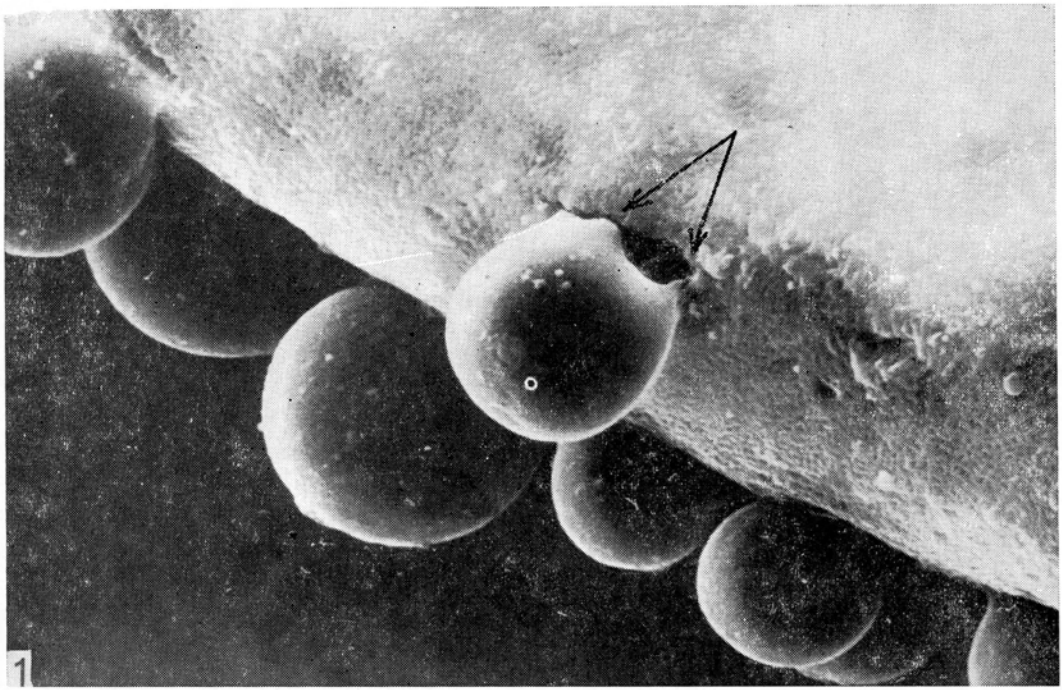
T. Marcinkiewicz
Acta Palaeobotanica XX/2

Plate VII

Reymanella globosa n. sp. on *Trileites murrayi* (Harris) Marcinkiewicz (scanning electron microscope)

1. Holotype

1, 2. Photomicrographs show the shape of spherules and the mode of their attachment with the help of neck-like appendages to the exine surface of the spore; × 1000


1

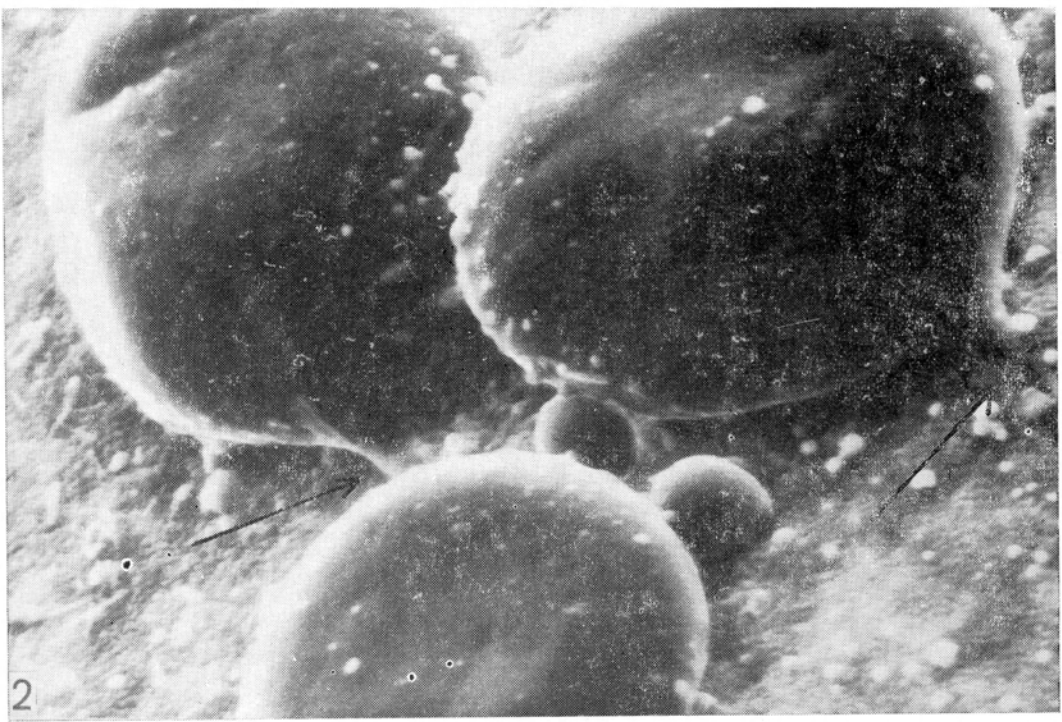
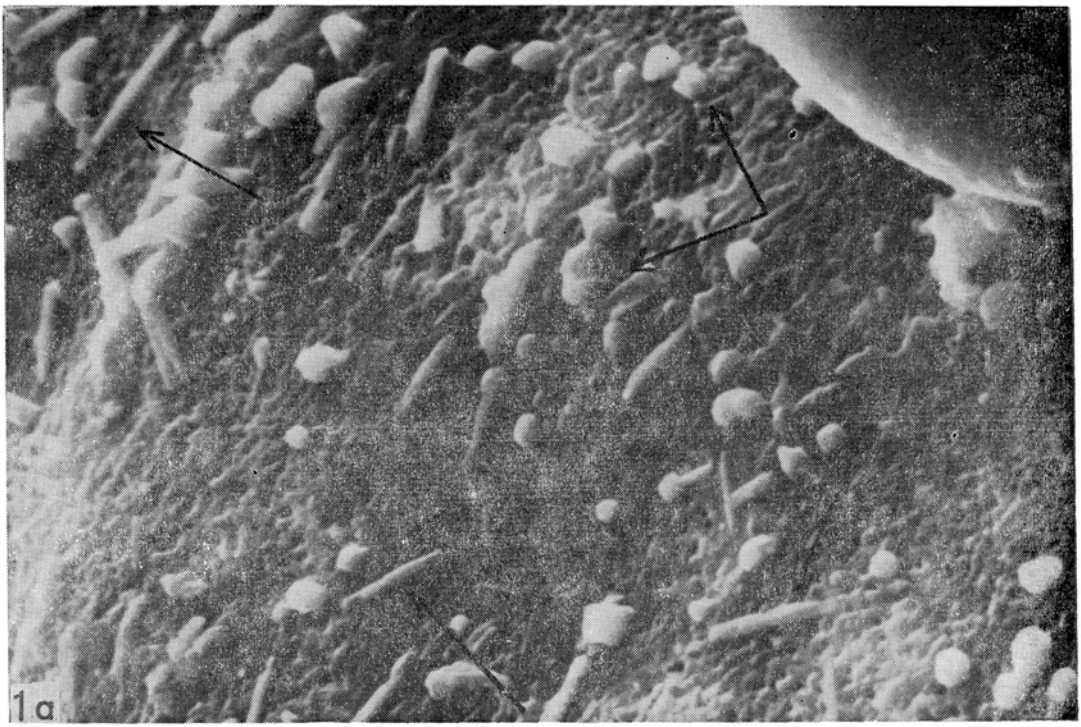

2

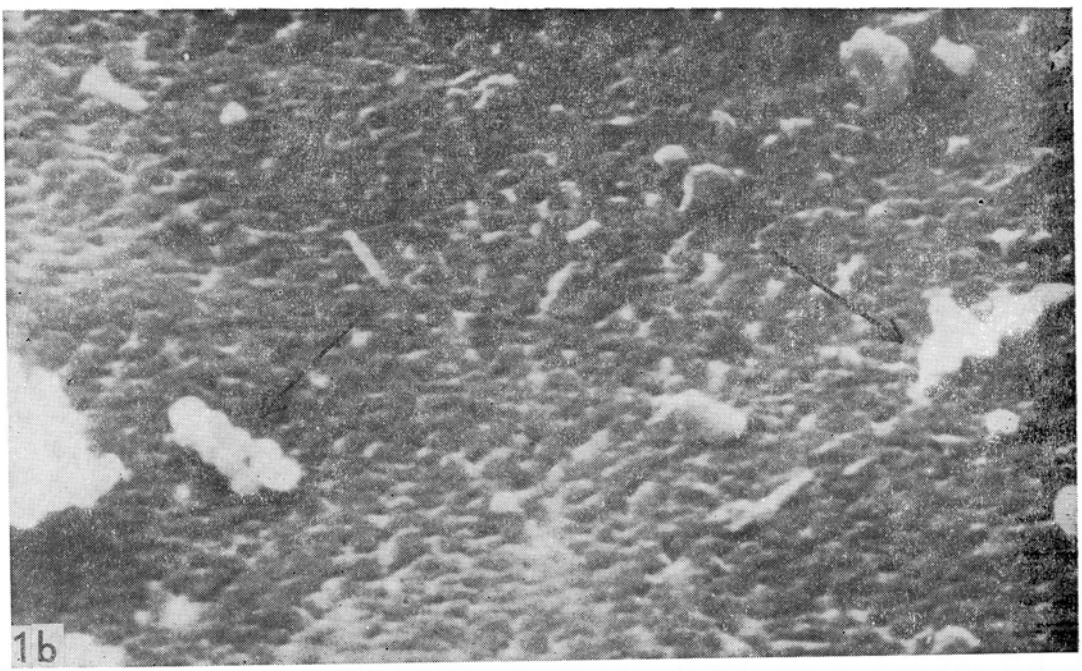
Plate VIII

Annella pulchra Srivastava on *Trileites murrayi* (Harris) Marcinkiewicz (scanning electron microscope)

1a. Photomicrograph shows the tubular hyphae and clusters of polygonal spherules attached to the exine surface of the spore; × 2000

1b. Same specimen shows 5 spherules linearly attached to the exine surface of the spore; × 5000


1a


1b