

PACHYPTERIS BANATICA (HUMML) DOLUDENKO FROM LIASSIC LOCALITY IN MECSEK MOUNTAINS, HUNGARY

Pachypteris banatica (Humml) Doludenko z liasowego stanowiska w górach
Mecsek, Węgry

MARIA BARBACKA

Department of Botany, Hungarian Natural History Museum, H-1088 Budapest, Könyves Kálmán krt. 40, Hungary

ABSTRACT: *Pachypteris banatica* from the new locality in the Mecsek Mountains in Hungary was examined. As the cuticular structure of the type specimen described by Humml (1969) from Steierdorf-Anina (Romania) was unknown (the specimen was lost), thorough examination of *P. banatica* from Hungary provided new data about this species. It was particularly important for comparison of *P. banatica* with the other species of *Pachypteris* and approved its taxonomical separation.

KEY WORDS: *Pachypteris banatica*, Liassic, Hungary

INTRODUCTION

The Liassic locality near Komló in Mecsek Mts. yields a rich flora preserved in deposits of pit coal, between coal layers. The character of the sediments covering this area suggests a delta plain environment (Paál-Solt 1969) with a tropical climate. The vegetation was probably typical for shallow swamps. The fossil flora, collected in 1950 and recently, contains specimens of *Equisetites*, *Todites*, *Clathropteris*, *Sagenopteris*, *Ctenozamites*, *Baiera*-type leaves and some conifers. The genus *Pachypteris* is represented by only one species *Pachypteris banatica* (with one specimen collected near Komló in 1953). *Pachypteris banatica* has been described by Humml (1969) from Liassic of Steierdorf-Anina in Romania under the name *Thinnfeldia banatica*, after revision reassigned by Doludenko (1974) to *Pachypteris* (*P. banatica*). Unfortunately, the description was based on the morphological features only and the type specimen is lost.

P. banatica has only been described from Liassic of Steierdorf-Anina (Romania) and is now for the first time described from the Mecsek Mountains. In the paleobotanical collections of the Geological Survey in Budapest and of the Hungarian Natural History Museum five indetermined specimens from Steierdorf-Anina (the type locality) were found, which morphological features well correspond with Humml's description and drawings (Humml 1969, Pl. 5 figs 8–10; Pl. 6 figs 11–14).

SYSTEMATICS

Pachypteris Brongniart 1828*Pachypteris banatica* (Humml) Doludenko 1974

Pl. 1 figs 1-2, 4-5; Pl. 2 figs 1-5; Pl. 3 figs 1-7; Pl. 4 figs 1-5; Pl. 5 fig. 1

1969 *Thinnfeldia banatica* Humml, p. 3691974 *Pachypteris banatica* (Humml) Doludenko, p. 101 (comb. illegit.)

Neotype. BMP-80-A

Material. BMP-12, BMP-80-B,C, BMP-81, BMP-82 (collection of Institute of Geology, Budapest), BP 60.220.1. (collection of the Hung. Nat. Hist. Mus. Budapest)

Age. Liassic (Hettangian)

Occurrence. Romania: Steierdorf-Anina, Hungary: Mecsek Mountains.

Diagnosis. Leaf variable in shape, from pinnate to bipinnate with intermediate forms. Rachis about 1.5–2 mm broad. Pinnules alternate, elliptical-elongate, max. 15 mm long and 5 mm broad. Their margins may be entire, partly lobed (usually near the base), or dissected over the whole length. Apex subacute, base converging, with a decurrent basal margin. Venation alethopteroid; midrib weakly distinguished, symmetrical, reaching to apex, secondary veins very thin.

The cuticle thick, the upper sometimes thicker than the lower one. Leaf amphistomatic, but on the upper cuticle stomata occur more rarely than on the lower one. Epidermal cells polygonal with rounded angles and straight cell walls. On the lower cuticle the midrib is indicated by elongated cells. Stomata are irregularly scattered over the whole surface except over the midrib. Two different types of stomata are present. Stomata of the first type are amphicyclic, in general shape ovate, consisting of 4–8 irregular subsidiary cells, radially arranged around the guard cells. The size and shape of the subsidiary cells corresponds with those of the epidermal cells. This type of stomata possess well cutinised walls of the guard cells. They are elongated with extended poles, reaching beyond the bounds of stomatal pit (Pl. 2 figs 1–5). Stomata of the second type are amphicyclic, in general shape ovate, consisting of 5–7 irregular subsidiary cells furnished with papillae often directed towards stomatal pit (Pl. 3 figs 1–4, 6). In this type of stomata the guard cells are weakly cutinised (usually not preserved). Sometimes remains of them may be observed as protruded rampart around the stomatal pit. Both types are found on the lower cuticle in equal number (fifty-fifty), irregularly mixed and scattered.

Two types of simple hair bases are found on the lower cuticle. Ones of the first type are irregularly distributed and consist of small, round, thick cell, among common cells (Pl. 3 fig. 7). The hair bases of the other type are surrounded in the most cases by 6 radially situated irregular cells with acute angles directed centrally. These angles are strongly cutinised and form a protruded thickening, round or stellate, with a central cavity. They are not numerous; along the midrib they occur a little more (Pl. 3 fig. 5; Pl. 4 figs 1–3). Cells of the upper cuticle are polygonal, in shape and size they correspond with cells of the lower cuticle. Sometimes they have central papillae. Neither the midrib nor secondary veins are indicated. Stomata occur only in the area of the midrib, mainly near the base of pinnule. Only type 1 stomata (without papillae) are found on the upper

cuticle. Hair bases are lacking, but there are several structures (hydatodes?) scattered irregularly in groups. They consist of radially arranged cells with strongly cutinised central part. These thickenings are large (about 40 μm in diameter), irregular or polygonal (slightly stellate). They possess a small cavity on the top which may suggest their connection with secretion (Pl. 4 figs 4–5; Pl. 5 fig. 1).

One surface of the rachis, probably lower, has the two types of stomata (without- and with papillae), occasionally simple hair bases. On the other, probably upper, surface type 1 stomata (without papillae) are found in small number. The simple hair bases are found on the upper surface; their structure is similar to those of the upper surface of pinule cuticle but they are smaller and usually consist of 4 radially arranged cells with the central thickenings, not of 5–7, as in the case of pinnule.

DISCUSSION AND COMPARISON

Both morphological and cuticular characters are different from those of *Pachypteris rhomboidalis* (Pl. 1 fig. 3; Pl. 5 figs 3, 5) from the same locality in Steierdorf-Anina (see Table 1). As for data of *P. rhomboidalis* which are found in the table, they are supplemented by details concerning hair bases which are not mentioned in description made by Doludenko. The cuticle of *P. rhomboidalis* examined by the author shows on the lower cuticle rarely scattered, simple hair bases (they are in the same type like those from the lower cuticle of *P. banatica*, see the description) and few simple hair bases on the upper cuticle. As I know, the pieces of cuticle examined by Doludenko (1971) were

Table 1.

	<i>P. banatica</i>	<i>P. rhomboidalis</i>	<i>P. papillosa</i>
shape of leaf	pinnate with tendency to bipinnate	pinnate	pinnate
shape of pinnula	elliptical or elongated, margins entire or irregularly lobed to dissected, long	elliptical, margins entire or undulated	elliptical, margins entire or irregularly lobed
structure of stomata of lower cuticle	two types of stomata (in equal number) 1 – without papillae, 2 – with papillae (not very thick)	stomata without papillae	stomata with strong papillae
other characters of the lower cuticle	rarely simple hair bases, rounded and irregular	rarely simple hair bases (the same type like in <i>P. banatica</i> , see the description)	cells often with central papillae
structure of stomata of upper cuticle	stomata without papillae (very few)	stomata like on the lower cuticle	stomata larger than those on the lower cuticle, with papillae (but not strong),
other characters of the upper cuticle	occasionally cells with central papillae, the midrib not marked by the elongated cells, hydatodes (?) -like structures	very rarely one-cells hair bases	

very small, so it might cause that she could not see any hair bases on them.

The other species which shows certain similarities with *P. banatica* is *P. papillosa* (Thomas & Bose) Harris (Hung. Nat. Hist. Mus. No BP 94.1.1, 94.2.1) from Yorkshire (Pl. 1 figs 6–7; Pl. 5 figs 2, 4). They both have stomata with papillae but the other characters are different (see Table 1).

P. banatica from the Mecsek Mountains is represented by only one specimen. More specimens of this species were collected in Steierdorf-Anina (Romania). It is certainly not enough to conclude about floristical relations, but may suggest similar conditions in both localities. As the general compound of the accompanying plants differs in both localities, *P. banatica* may belong to a specialized group, whose existence depends rather on local soil terms than on association with plant communities.

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PLATES

Plate 1

1. *Pachypteris banatica* (neotype), Steierdorf-Anina (Hung. Geol. Surv., No BMP-80)
2. *P. banatica*, Steierdorf-Anina (Hung. Geol. Surv. No BMP-80)
3. *P. rhomboidalis*, Steierdorf-Anina (Hung. Nat. Hist. Mus., No BP 60.216.1)
4. *P. banatica*, Steierdorf-Anina (Hung. Geol. Surv., No BMP-81)
5. *P. banatica*, Mecsek Mountains (Hung. Geol. Surv., No BMP-12)
- 6-7. *P. papillosa*, Yorkshire (Hung. Nat. Hist. Mus., No 94.1.1, 94.2.1)

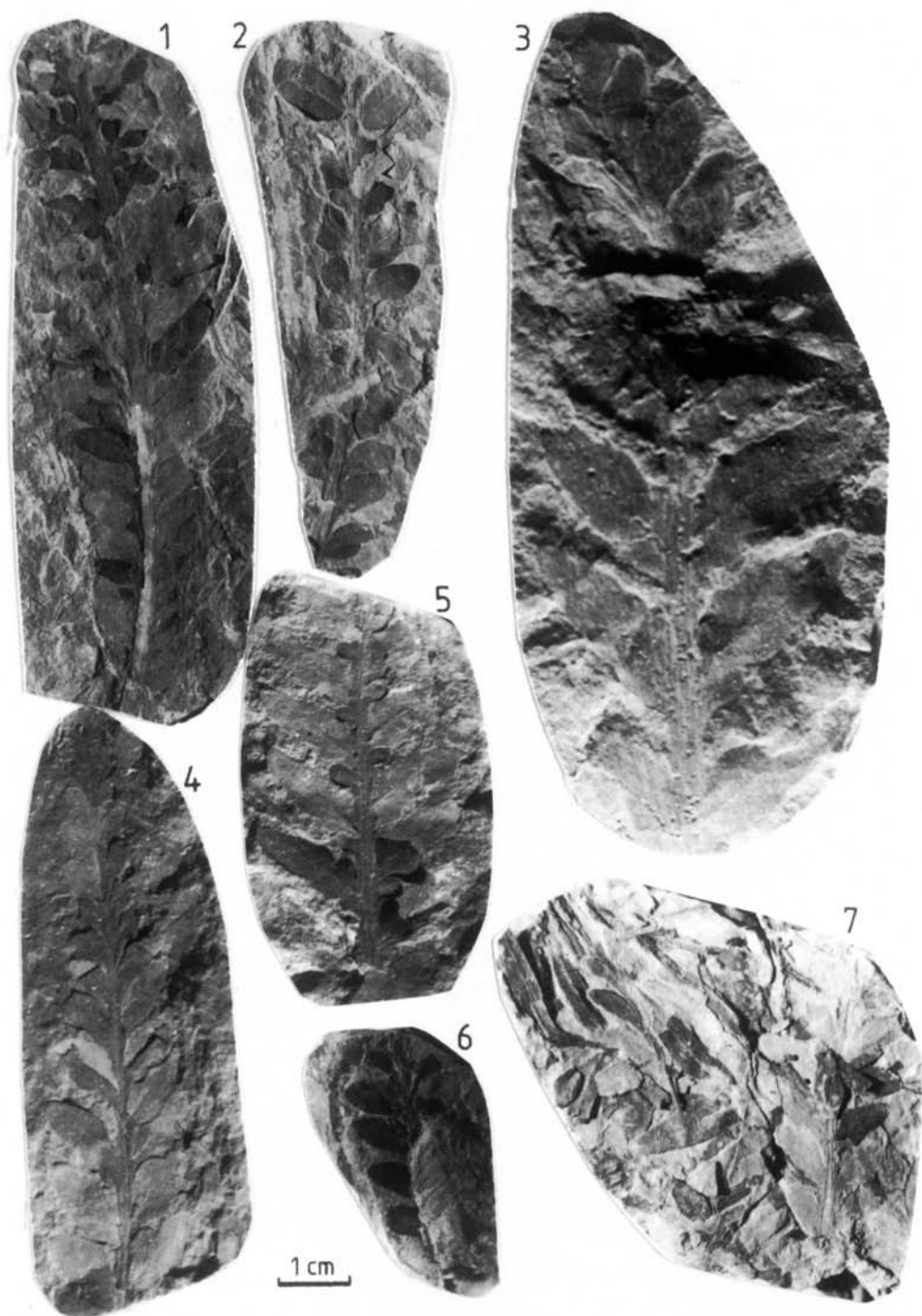


Plate 2

Pachypteris banatica

1. Lower cuticle, stomata without papillae, from the inside (BMP-80, slide 365)
2. Upper cuticle, unusually large stoma without papillae, from the inside (BMP-12, slide 385)
3. Stoma without papillae from the inside, SEM, (BMP-80)
4. Stoma without papillae from the outside, SEM, (BMP-80)
5. stoma without papillae from the inside, SEM, (BMP-12)

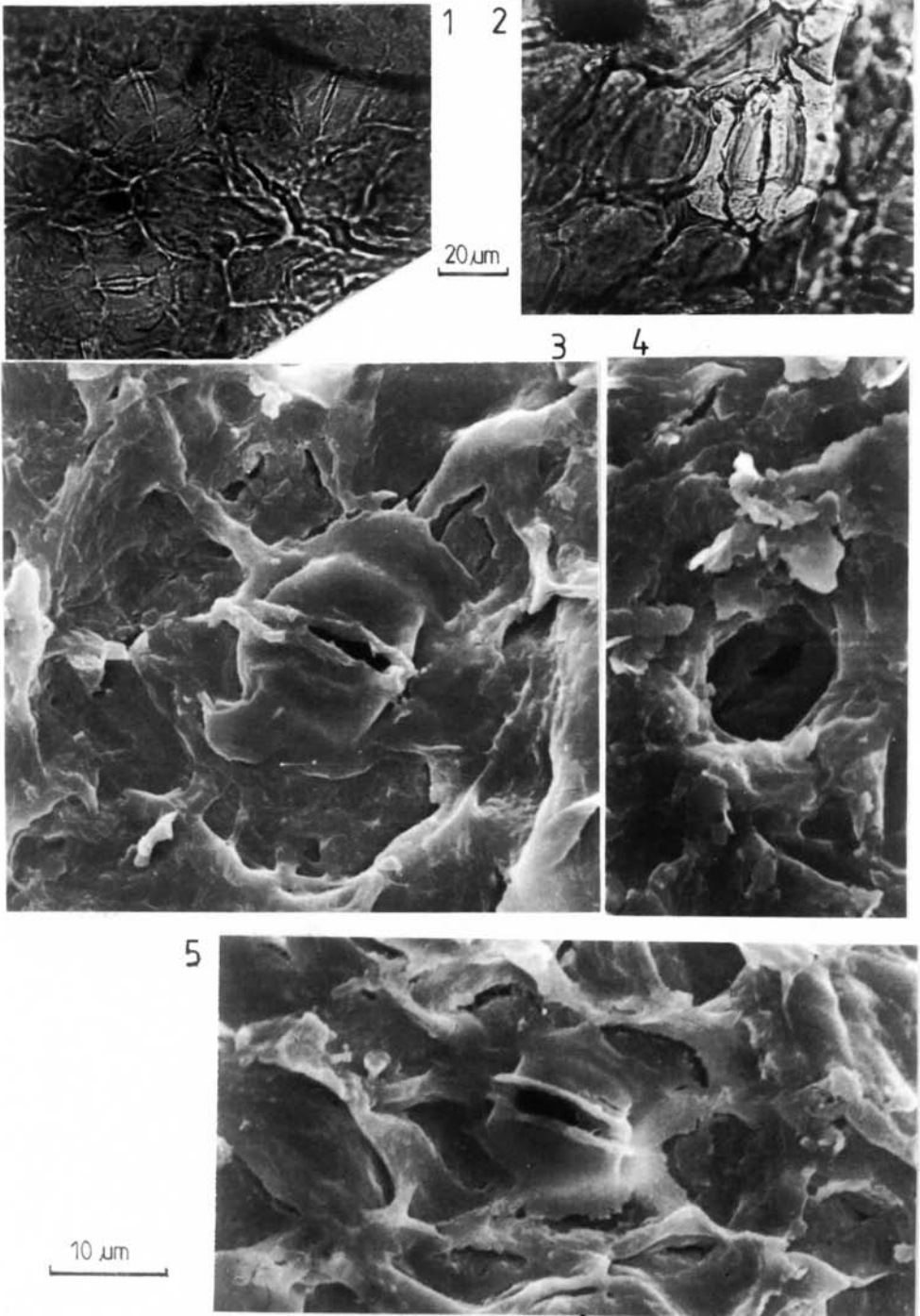
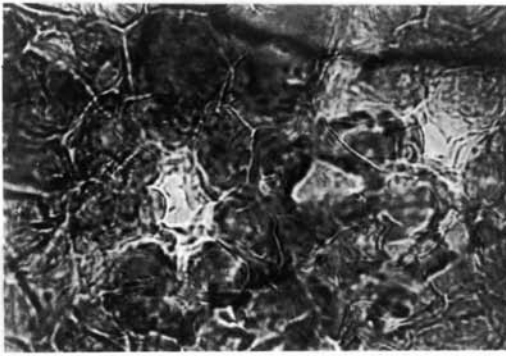


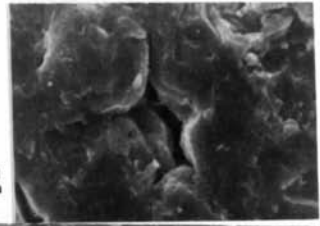
Plate 3

Pachypteris banatica

1. Lower cuticle, two stomata with papillae, from the outside (BMP-80, slide 369)
- 2–3. Lower cuticle, stomata with papillae from the outside, SEM, (BMP-80)
4. Lower cuticle, stoma with papillae from the inside, SEM, (BMP-12)
5. Lower cuticle from the inside, hair base, SEM, (BMP-80)
6. Lower cuticle from the inside, two types of stomata (with- and without stomata), SEM, (BMP-12)
7. Lower cuticle from the inside, hair base, SEM, (BMP-80)

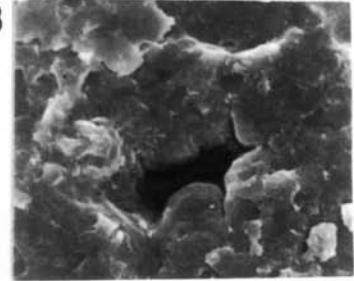


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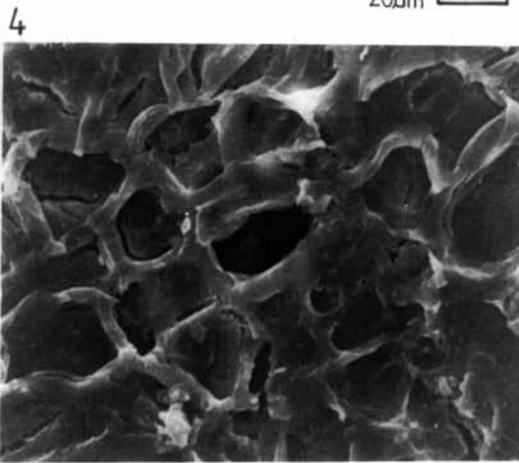
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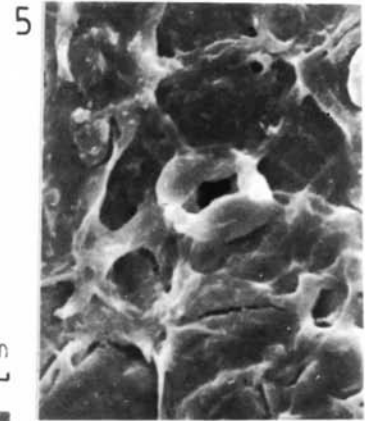
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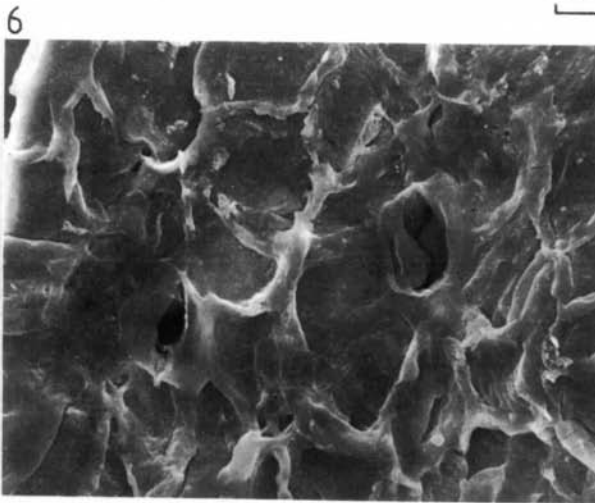
4

20µm



5

10µm



6



7

10µm

Plate 4

Pachypteris banatica

1. Lower cuticle from the inside, hair base over the midrib (BMP-80, slide 365)
2. Lower cuticle from the inside, hair base over the midrib, SEM, (BMP-80)
3. Lower cuticle from the inside, hair base, SEM, (BMP-80)
- 4-5. Upper cuticle from the inside, hydatode (?) -like structures (BMP-80, slide 365)

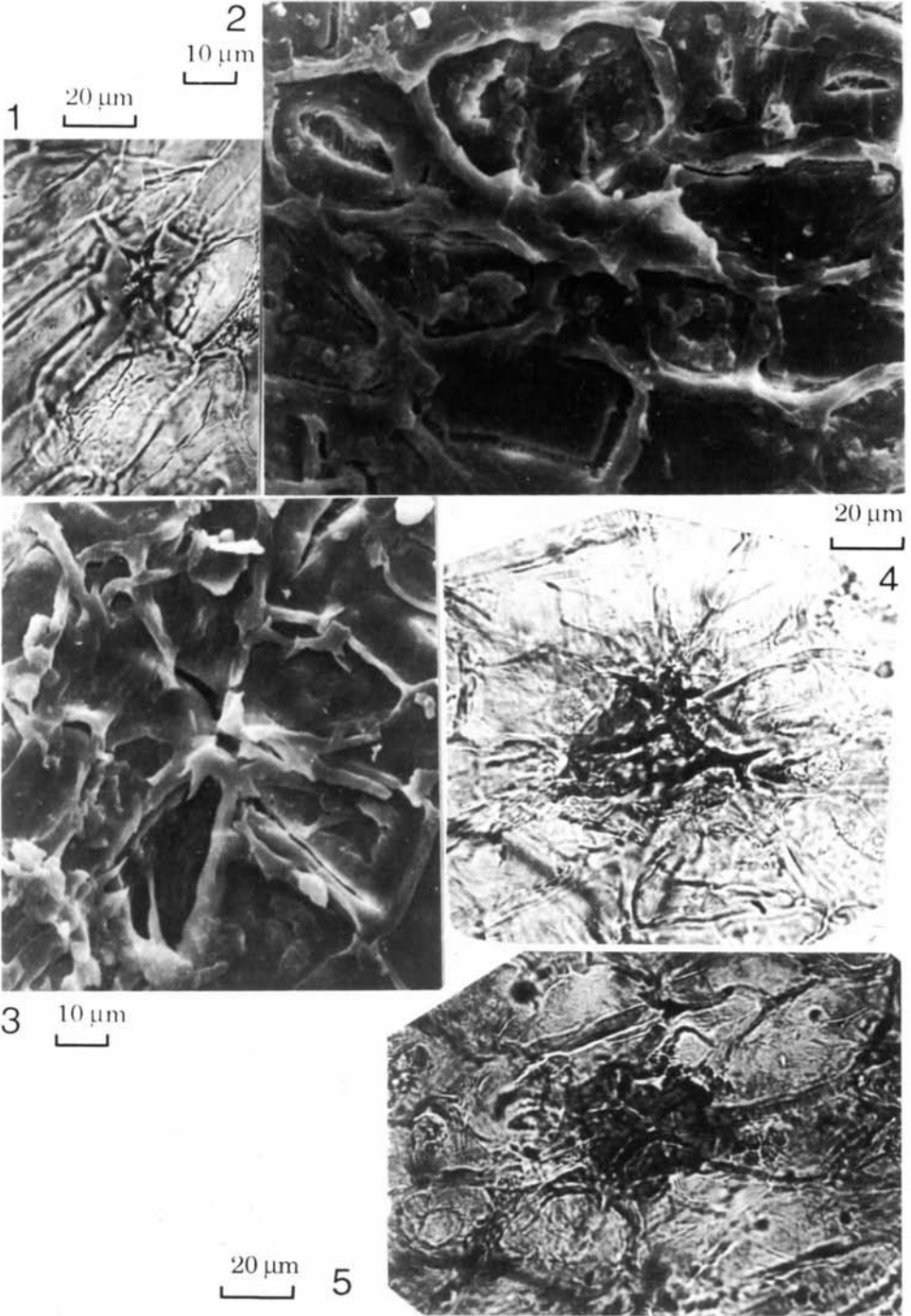


Plate 5

1. *Pachypteris banatica*, upper cuticle from the inside, hydatode (?) -like structure, SEM, (BMP-80)
2. *P. papillosa*, lower cuticle from the outside, stomata, SEM, (BP 94.2.1.)
3. *P. rhomboidalis*, lower cuticle from the outside, stoma, SEM, (BP 60.216.1.)
4. *P. papillosa*, lower cuticle from the inside, stoma (BP 94.2.1.)
5. *P. rhomboidalis*, lower cuticle from inside, SEM, (BP 60.216.1.)

