



# Taxonomical revision of the Collection of Jurassic plants from Roverè di Velo (Veneto, northern Italy) stored in the Palaeontological Museum of the University of Naples "Federico II"

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**KEY WORDS** - Palaeobotanical collection, Jurassic, Roverè di Velo, Palaeontological Museum of the University of Naples.

**ABSTRACT** - This paper presents a revision of the Jurassic fossil plants collection from Roverè di Velo (Verona Province) housed in the Palaeontological Museum of the "Federico II" University of Naples.

It was extremely difficult to review the entries of the Roverè di Velo plant fossils stored in the Museum. Indeed, only by finding ancient purchase inventories of the former Museum of Geology pre-dating the foundation of the Palaeontological Museum, we got enough information to pursue our purposes. Using these inventories, it is now possible to know the Museum of Geology purchased the Roverè di Velo fossil plants in 1874. Yet, only partial cataloguing of this collection was carried out, since.

In the course of this study the provisional classification carried out in the second half of the XIX century was completely revised, and a number of additional specimens have been identified and catalogued, accordingly.

Owing to the lack of cuticle, we had ascertained taxonomic affiliations relying on macroscopic features, only. At present, the collection includes 69 slabs with plant remain content. During the taxonomical revision, the following fossil plant genera have been identified: *Cycadopteris* De Zigno, 1853; *Dichopteris* De Zigno, 1864; *Sagenopteris* Presl, 1838; *Otozamites* Braun, 1843; *Ptilophyllum* Morris, 1840; *Pagiophyllum* Heer, 1881; *Brachyphyllum* Brongniart, 1828; *Desmiophyllum* Lesquereux, 1878.

**RIASSUNTO** - [Revisione tassonomica della Collezione di piante giurassiche di Roverè di Velo (VR) conservate nel Museo Paleontologico dell'Università di Napoli "Federico II"] - Il presente lavoro si occupa della revisione di una collezione di piante fossili giurassiche del giacimento di Roverè di Velo (VR) conservata nel Museo di Paleontologia dell'Università di Napoli "Federico II". La ricostruzione delle modalità di acquisizione del materiale vegetale di Roverè di Velo presso l'Ateneo Napoletano si è rivelata estremamente difficoltosa; infatti, solo il fortuito ritrovamento degli antichi inventari d'acquisto del Museo di Geologia, struttura che ha preceduto l'istituzione del Museo di Paleontologia, avvenuta solo nel 1932, ha permesso il reperimento di tali informazioni. Dalle notizie ricavate da tali inventari, risulta che al momento dell'ingresso del materiale al Museo di Geologia, alla fine del 1874, venne effettuata solo una parziale classificazione del materiale catalogato. Solo successivamente sarebbe stata effettuata una ulteriore classificazione dei campioni ad opera del Prof. Guglielmo Guiscardi, Direttore dell'Istituto di Geologia della Regia Università di Napoli dal 1861 al 1885.

Attualmente la collezione è composta da 69 lastre includenti resti di piante. A causa dell'assenza di cuticola, le determinazioni si basano esclusivamente sull'analisi di caratteristiche macroscopiche.

In seguito alla revisione tassonomica, nella collezione sono presenti i seguenti generi: *Cycadopteris* De Zigno, 1853; *Dichopteris* De Zigno, 1864; *Sagenopteris* Presl, 1838; *Otozamites* Braun, 1843; *Ptilophyllum* Morris, 1840; *Pagiophyllum* Heer, 1881; *Brachyphyllum* Brongniart, 1828; *Desmiophyllum* Lesquereux, 1878.

## INTRODUCTION

The *Centro Museale*, "Centro Musei delle Scienze Naturali" at the "Federico II" University, was set up in 1992 by uniting four institutions: the "Museo di Antropologia", the "Museo di Mineralogia", the "Museo di Zoologia" and the "Museo di Paleontologia" (Barattolo & Del Re, 1999; D'Erasmo, 1926). The oldest unit is the "Museo di Mineralogia", instituted in 1801. Successively, part of the mineralogical collection merged into the "Museo di Geologia", and lastly (1932) they partially merged into the "Museo di Paleontologia". Studies carried out at these institutions so far, usually focused on the vertebrate and invertebrate fossil faunas there stored (Costa, 1853-1864; D'Erasmo, 1912, 1914-1915; D'Erasmo & Moncharmont-Zei, 1955; Moncharmont-Zei & Moncharmont, 1987; Bravi & De Castro, 1995). With

the exception of a study on the fossil plant yielding of "Monte Somma" lava (Meschinelli, 1890), little attention was paid to the vegetal macrofossils housed in the Museum collections.

When the first investigation took place, no documentation was available, apart from the labels accompanying some, but by no means all the samples. It was thus extremely difficult to understand how this collection became part of the Palaeontological Museum. Only the accidental discovery of the ancient purchase inventories of the "Museo di Geologia" (*Prospetti delle variazioni inventariali dall'anno 1871 al 1875*) formerly considered lost, made it possible to trace the historical route of the specimens from Roverè di Velo (Verona Province; Fig. 1) to the Museum (Pl. 1, fig. 1).

The specimens were collected by Giovanni Meneguzzo, a native of Vicenza, and active fossil

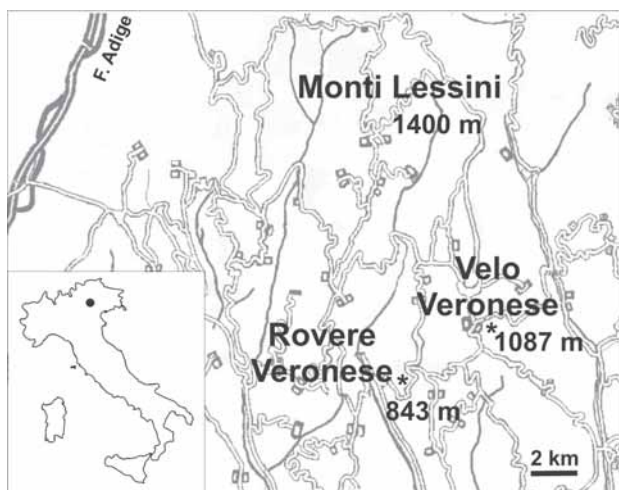


Fig. 1 - Map of the Roverè Veronese and Velo Veronese area.

collector of his times (Zamperetti, 1999). Subsequently, he sold the fossils to Prof. Guglielmo Guiscardi (Director of the “Istituto di Geologia” at the University of Naples from 1861 to 1885).

The reference numbers on the specimen labels (1811-1888) correspond to those indicated in the inventory books, and relate to 77 slabs with fossil plant remains purchased in the year 1874 at a cost of 47 Lire. The inventory book describes 55 specimens as “indeterminable”. As some specimens have two different labels, both with the heading “Museo di Geologia”, we argue that the classification was later improved by Prof. Guiscardi (Pl. 1, fig. 2). Furthermore, six samples (n. 17724-29) are labelled with the heading “Museo Paleontologico”, and therefore must have been compiled after 1932. They are probably mere copies of labels already compiled by Guiscardi. Eight specimens were lost, since the present collection just includes 69 slabs (Tab. 1).

#### MATERIALS AND METHODS

Samples were first cleaned by immersion in water. Subsequent cleansing was performed by using a small, rigid-bristled brush on the embedding matrix, and a paintbrush with soft bristles. Finally, the specimens were dried at room temperature. Fractures noted on the specimens were consolidated by using Paraloid B72.

The taxonomic identification was carried out using a stereomicroscope (Wild M8). Study pictures were obtained using a Fuji s5000 digital camera. We performed cataloguing using the Microsoft Access© software.

#### LOCATIONS, STRATIGRAPHY AND SEDIMENTOLOGICAL SETTING

Comparing data of inventory book of purchase records in the “Museo di Paleontologia” with the literature (De Zigno, 1856-1885; Barale, 1982;

Thevenard et al., 2005), it came out that the fossil samples housed in the Museum collection came from the Calcarei Grigi Group (Avanzini et al., 2006) near the village of Roverè di Velo (Verona, Italy; Fig. 1).

The two lower sections are named Eugna Formation and Loppio Oolite, while the third or “uppermost” section corresponds to the Rotzo Formation (Bosellini & Broglio Loriga, 1971; Avanzini et al., 2006).

Historically, the macroflora is part of the Rotzo Formation (Sinemurian-Pliensbachian), the best studied unit of the Calcarei Grigi Group, which yields large bivalves of the *Lithiotis* facies (Boomer et al., 2001; Fugagnoli & Broglio Loriga, 1996), and continental flora (De Zigno, 1856-1885). The Early Jurassic age is supported by foraminiferal association, ammonites, and palynomorphs (see Fugagnoli & Broglio Loriga, 1996).

The Rotzo Formation is characterized by numerous dark clay beds, and massive calcareous bars with *Lithiotis* in the upper part. The latter is composed of 36 lithological units. The plant-rich fossil horizon yielding the De Zigno collection is the 25<sup>th</sup> unit (Bosellini & Broglio Loriga, 1971). It has a thickness of 0.60 m. Lithologically, it is a dark, grey, slightly calcareous clay bed (Thevenard et al., 2005; Bosellini & Broglio Loriga, 1971).

#### SYSTEMATIC DESCRIPTION

Class PTERIDOSPERMOPSIDA  
Order CORYSTOSPERMALES  
Family CORYSTOSPERMACEAE

Genus *Cycadopteris* De Zigno, 1853

*Cycadopteris brauniana* De Zigno, 1861 emend.  
Barale, 1981  
Pl. 1, figs. 3-4

**Material studied** - Slabs n. 5750, 5754, 5755, 5757, 5759, 5762, 5765, 5767, 5768, 5770, 5771, 5772, 5775, 5777, 5780, 5782, 5783, 5784, 5785, 5786, 5788, 5789, 5790, 5791, 5792, 5798, 5799, 5800, 5801, 5802, 5803, 5804, 5805, 5807, 5808, 17724, 17725, 17727.

**Description** - Fronds with monopinnate and bipinnate morphology. Pinnae rise oppositely to suboppositely from the rachis.

The monopinnate fronds are oval to linear in overall shape. The biggest sample (n. 5750) is 15.4 cm long and 2.3 cm wide. The petiole is up to 2.5 cm long (n. 5800) and 2.5 mm wide.

Linear-oblong pinnae form an acute angle (about 70°) with the main rachis. Pinnae are inserted along the upper surface of the rachis: a marginal thickness is visible (n. 5765, 5772: Pl. 1, fig. 4).

The pinnae are typically 3 to 5 mm wide and 4-3.1 cm long: the largest pinna is 3.1 cm long and 5 mm wide (n. 5754).

The bipinnate fronds are oval in general shape. Pinnules are about 3 mm wide, and 2-5 mm long. The bipinnate samples in the collection (n. 5782, 5783, 5784, 5785, 5786, 5788, 5789, 5792, 5802), were ascribed in

the 19<sup>th</sup> century to the species *C. heerii* Zigno, as may be seen from the labels.

**Discussion** - In the Roverè di Velo collection, *C. brauniana* represents the most common species. Barale (1981) in his work on the West European species of *Cycadopteris* redefines the main features (macro and micro) of this genus, with a revision its diagnostic characteristics. In particular, within the *C. brauniana* species, Barale (1981, 1982) identifies three frond morphotypes: monopinnates with more or less contiguous pinnae, a transitional form between the monopinnates and the bipinnates, and bipinnates in which the pinnae change forming pinnules towards the apex of the frond. Thereby, Barale (1981) emended the genus *Cycadopteris* including in *C. brauniana* monopinnate fronds (*C. brauniana sensu* De Zigno), fronds showing transition from the monopinnate to the bipinnate morphology (*C. undulata* De Zigno) and bipinnate fronds (*C. heerii* De Zigno).

Monopinnate and bipinnate fronds are present in the collection and are related to the *C. brauniana* De Zigno on the basis of Barale's revision (1981, 1982).

Genus *Dichopteris* De Zigno, 1864

*Dichopteris visianica* De Zigno, 1864  
Pl. 1, figs. 5-6

**Material studied** - Slabs n. 5756, 5757, 5760.

**Description** - There are three pinnae fragments in the collection; the largest (n. 5756) is 5.7 cm long by 2.2 cm wide, while the smallest (n. 5760) is 1.8 cm long by 1.2 cm wide.

The subopposite pinnules have slightly contracted bases (Pl. 1, fig. 5) and either acute or rounded apex. The rachis is longitudinally striated (n. 5756). The veins are more or less parallel or slightly divergent, and dichotomized near the margins. The overall shape of the pinnules is typically odontopteridian (Thévenard et al., 2005).

**Discussion** - Based on macromorphology, De Zigno (1864) established seven species; *Dichopteris visianica* was the first to be described and published by De Zigno (1864), and is therefore considered to be the type species (Andrews, 1955).

De Zigno (1864) indicated similarities between the *Dichopteris* fronds and those of the *Pachypteris* genera previously established by Brongniart (1828). Brongniart described the *P. lanceolata* pinnules having no veins, or possessing only a midrib: the absence of visible veins in most species is due to the fleshy nature of the segments (Seward, 1963). *Dichopteris* differs however from *Pachypteris* due to the presence of pinnules of the odontopteridian type, while *Pachypteris* has pinnules of the sphenopteridian type (Thévenard et al., 2005) with a clearly distinct midrib (Harris, 1964).

Schimper (1869-1874) transferred the seven species of *Dichopteris* described by De Zigno (1864) into *Pachypteris*, but later he (Schimper, 1869-1874) recommended the retention of *Dichopteris* and of the seven species established by De Zigno (Thevenard et al., 2005).

In his inventory book, Guiscardi named two specimens *Pachypteris angustifolia* (n. 5756, 5757), probably in reference to Schimper's (1869-1874) revision. According to Thevenard et al. (2005), however, *P. angustifolia* is a synonym of *D. visianica*.

*Dichopteris cf. rhomboidalis*  
Pl. 1, fig. 7

**Material studied** - Slab n. 5807.

**Description** - A pinna fragment with 15 pinnules only on the right side of the rachis. The fragment is 5.2 cm long and 9 mm wide, gently narrowing toward the apex. The rachis decreases from 2 mm at the base to 1.5 mm to the apex. Pinnules are small, about 7 mm long and 4 mm wide at the base and 4 mm long and 2 mm wide at the apex; the apex is almost rounded. The space between the pinnules is about 3 mm in the middle part of the pinna. Venation is more or less visible.

**Discussion** - The diagnostically-relevant features of this specimen allow us the attribution to the genus *Dichopteris* and, with uncertainly, to De Zigno's *Dichopteris rhomboidalis* (1856-85; Vol. I, Tav. XV, fig. 4).

Order CAYTONIALES  
Family CAYTONIACEAE

Genus *Sagenopteris* Presl, 1838

*Sagenopteris goeppertiana* De Zigno, 1885  
Pl. 1, fig. 8

**Material studied** - Slabs n. 5749, 5750, 5751, 5752, 5753, 17730.

**Description** - The material consists of two complete (n. 5749, 17730), and four incomplete (n. 5750, 5751, 5752, 5753) leaflets. The largest leaflet (n. 17730; Pl. 1, fig. 8) is 10.8 cm long and 3.9 cm wide, while the smallest (n. 5749) is 5.6 cm long and 3 cm wide.

According to De Zigno's description (1856-1868) it is possible to distinguish two types of leaflets: median and lateral, on the basis of their shape and layout within the palmate leaf. The general shape is lanceolate in the lateral leaflets and obovate in the median ones. The median leaflets have a rounded apex while the lateral ones are obtuse and unequal (De Zigno, 1856-1868).

According to this diagnosis in the collection can be distinguished four lateral (n. 5749, 5750, 5751, 5752) and two median (n. 5753, 17730) leaflets with an entire margin. Only specimen n. 5753 is an almost complete leaf with two leaflets, one being complete and the other incomplete. The petiole is 3 mm wide. All leaflets examined in the collection show a distinct midrib that slightly incurved. It reaches a maximum 2 mm in width (Pl. 1, fig. 8), disappearing shortly below the apex. Secondary veins arise from the rachis with an angle of ca. 25°, they then fork and anastomose irregularly giving origin to elongated meshes.

*Discussion* - Although incomplete, the leaflets are well preserved. As with the ancient purchase inventory, the specimens numbered 1811-1816 were partially classified by Meneguzzo as *Sagenopteris*. Later, Guiscardi named specimens n. 5749, 5750-5753 and 17730 (present number inventory) *Sagenopteris goeppertiana* De Zigno. The taxonomy of the genus *Sagenopteris* remained confused (see Zaton et al., 2006). According to Harris (1964), specific determination is impossible standing on macromorphology alone and needs being implemented by a cuticular study. The De Zigno description relates only to macromorphological features. The specific attribution of the Roverè di Velo specimen may be confirmed by comparing them with Zigno's *S. goeppertiana* description.

Class CYCADEOIDS  
Order BENNETTITALES

Genus *Otozamites* Braun, 1843

*Otozamites bunburyanus* De Zigno, 1852  
Pl. 1, fig. 9

*Material studied* - Slab n. 5781.

*Description* - The leaf fragment is pinnate and straight: 10.5 cm long and 1.3 cm wide, narrowing toward the base. Smallest pinnae are triangular, rounded-cordate, alternate, slightly longer than wide, up to 8 mm long and 4 mm wide. The basiscopic margin is not decurrent, the acroscopic basal angle is not greatly inflated to form a typical auricle. The rachis is approximately 1.5 mm wide. On the middle left side of the leaf fragment there are no pinnae. Numerous veins, dichomising once, diverging from the middle of the base acroscopically and basiscopically.

*Discussion* - This relatively small fragment of leaf is sufficiently preserved to enable to assign it to this species. According to De Zigno (1856-85; Vol. II, p. 103), this specimen would be a young leaf.

*Otozamites cf. bunburyanus* ?  
Pl. 1, fig. 10

*Material studied* - Slab n. 5779.

*Description* - A medial-basal leaf fragment of a linear pinnate leaf: 8 cm long and 1.5 cm wide with a well-preserved petiole of 22 mm length. The leaf narrows gradually toward the base. Most of the pinnae are small (7 mm long and 5 mm wide) with an obtuse apex; the proximal pinnae are almost rounded. No venations are visible.

*Discussion* - Owing to the poorly preserved pinnae attachment to the rachis and venation features, it is not possible to make a specific assignment, therefore based mainly on the general shape of the specimen, we follow Guiscardi's classification and assign the specimen doubtfully to the species *O. bunburyanus*.

*Otozamites feistmantelii* De Zigno, 1885  
Pl. 1, fig. 11

*Material studied* - Slabs n. 5766, 17726.

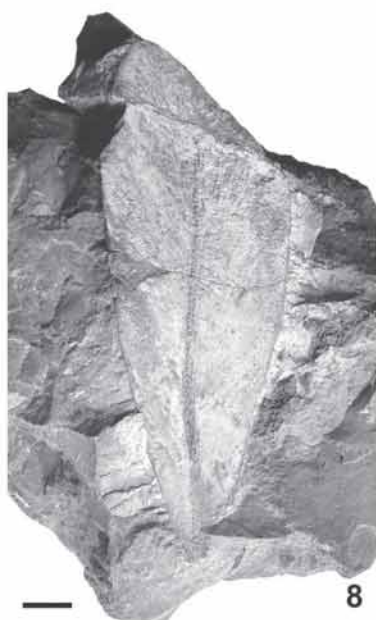
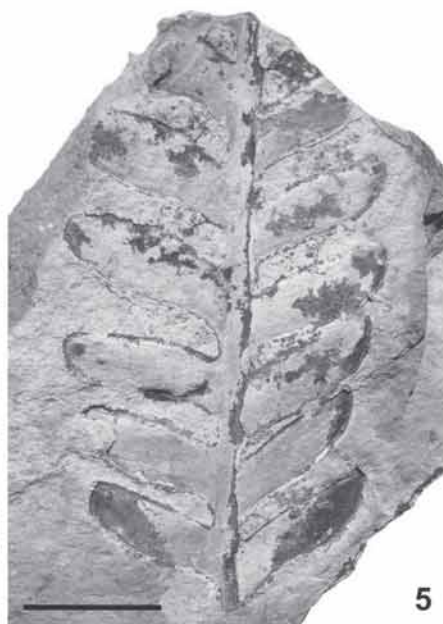
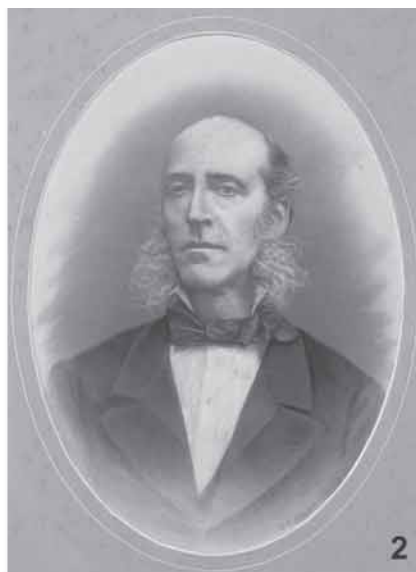
*Description* - The specimen n. 5766 shows the adaxial side of the leaf, while the sample n. 17726 presents the abaxial side of a complete leaf. Both leaves are pinnates. Sample n. 5766 is 11.5 cm long and 2 cm wide while the specimen n. 17726 is 14.5 cm long and 2 cm wide. The overall leaf shape is lanceolate. The leaves taper gently toward both the base and the apex. The petiole is up to 12 mm long. The pinnae are alternately inserted, their largest size is 10 mm in length and 7 mm in width. They have lunate to semicordate bases, and rounded apex. The acroscopic lobe expands into a wide and well-developed rounded auricle covering the rachis (n. 5766; Pl. 2, fig. 8) and slightly overlaps the bases of the opposite pinnae. The rachis is 3 mm wide. The rachis and some parts of the pinnae are coalified. There are numerous, barely visible, very fine veins crossing the lamina.

#### EXPLANATION OF PLATE 1

- fig. 1 - Page of the inventory book: "*Prospetti delle variazioni inventariali dall'anno 1871 al 1875*". (Prospectus of the inventory variations during the years 1871-1875).
- fig. 2 - Portrait of the Professor Guglielmo Guiscardi.
- fig. 3 - *Cycadopteris brauniana* Zigno, frond showing typical folding of the pinnae (n. 5772).
- fig. 4 - *Cycadopteris brauniana* Zigno, Pinnae showing primary and secondary veins (n. 17727).
- fig. 5 - *Dichopteris visianica* Zigno (n. 5756).
- fig. 6 - *Dichopteris visianica* Zigno, pinnae showing odontopteridian venation (n. 5757).
- fig. 7 - *Dichopteris* sp., pinna fragment with pinnules presenting typically odontopteridian venation (n. 5807).
- fig. 8 - Median leaflet of *Sagenopteris goeppertiana* Zigno (n. 17730).
- fig. 9 - Leaf fragment of *Otozamites bunburyanus* Zigno (n. 5781).
- fig. 10 - Petiolate leaf fragment of *Otozamites cf. bunburyanus* Zigno (n. 5779).
- fig. 11 - *Otozamites feistmantelii* Zigno sample, abaxial view of leaf (n. 17726).

Scale bar = 10 mm.

| ENTRATA    |            |             |             |            |            |            |            |            |            |
|------------|------------|-------------|-------------|------------|------------|------------|------------|------------|------------|
| NUM. FOLIO | DATA       | ESPOSIZIONE | DESCRIZIONE | VALORE     | VALORE     | VALORE     | VALORE     | VALORE     | VALORE     |
| NUM. FOLIO | DATA       | ESPOSIZIONE | DESCRIZIONE | VALORE     | VALORE     | VALORE     | VALORE     | VALORE     | VALORE     |
| 100        | 10/10/1874 | 10/10/1874  | 10/10/1874  | 10/10/1874 | 10/10/1874 | 10/10/1874 | 10/10/1874 | 10/10/1874 | 10/10/1874 |
| 101        | 11/10/1874 | 11/10/1874  | 11/10/1874  | 11/10/1874 | 11/10/1874 | 11/10/1874 | 11/10/1874 | 11/10/1874 | 11/10/1874 |
| 102        | 12/10/1874 | 12/10/1874  | 12/10/1874  | 12/10/1874 | 12/10/1874 | 12/10/1874 | 12/10/1874 | 12/10/1874 | 12/10/1874 |
| 103        | 13/10/1874 | 13/10/1874  | 13/10/1874  | 13/10/1874 | 13/10/1874 | 13/10/1874 | 13/10/1874 | 13/10/1874 | 13/10/1874 |
| 104        | 14/10/1874 | 14/10/1874  | 14/10/1874  | 14/10/1874 | 14/10/1874 | 14/10/1874 | 14/10/1874 | 14/10/1874 | 14/10/1874 |
| 105        | 15/10/1874 | 15/10/1874  | 15/10/1874  | 15/10/1874 | 15/10/1874 | 15/10/1874 | 15/10/1874 | 15/10/1874 | 15/10/1874 |
| 106        | 16/10/1874 | 16/10/1874  | 16/10/1874  | 16/10/1874 | 16/10/1874 | 16/10/1874 | 16/10/1874 | 16/10/1874 | 16/10/1874 |
| 107        | 17/10/1874 | 17/10/1874  | 17/10/1874  | 17/10/1874 | 17/10/1874 | 17/10/1874 | 17/10/1874 | 17/10/1874 | 17/10/1874 |
| 108        | 18/10/1874 | 18/10/1874  | 18/10/1874  | 18/10/1874 | 18/10/1874 | 18/10/1874 | 18/10/1874 | 18/10/1874 | 18/10/1874 |
| 109        | 19/10/1874 | 19/10/1874  | 19/10/1874  | 19/10/1874 | 19/10/1874 | 19/10/1874 | 19/10/1874 | 19/10/1874 | 19/10/1874 |
| 110        | 20/10/1874 | 20/10/1874  | 20/10/1874  | 20/10/1874 | 20/10/1874 | 20/10/1874 | 20/10/1874 | 20/10/1874 | 20/10/1874 |
| 111        | 21/10/1874 | 21/10/1874  | 21/10/1874  | 21/10/1874 | 21/10/1874 | 21/10/1874 | 21/10/1874 | 21/10/1874 | 21/10/1874 |
| 112        | 22/10/1874 | 22/10/1874  | 22/10/1874  | 22/10/1874 | 22/10/1874 | 22/10/1874 | 22/10/1874 | 22/10/1874 | 22/10/1874 |
| 113        | 23/10/1874 | 23/10/1874  | 23/10/1874  | 23/10/1874 | 23/10/1874 | 23/10/1874 | 23/10/1874 | 23/10/1874 | 23/10/1874 |
| 114        | 24/10/1874 | 24/10/1874  | 24/10/1874  | 24/10/1874 | 24/10/1874 | 24/10/1874 | 24/10/1874 | 24/10/1874 | 24/10/1874 |
| 115        | 25/10/1874 | 25/10/1874  | 25/10/1874  | 25/10/1874 | 25/10/1874 | 25/10/1874 | 25/10/1874 | 25/10/1874 | 25/10/1874 |
| 116        | 26/10/1874 | 26/10/1874  | 26/10/1874  | 26/10/1874 | 26/10/1874 | 26/10/1874 | 26/10/1874 | 26/10/1874 | 26/10/1874 |
| 117        | 27/10/1874 | 27/10/1874  | 27/10/1874  | 27/10/1874 | 27/10/1874 | 27/10/1874 | 27/10/1874 | 27/10/1874 | 27/10/1874 |
| 118        | 28/10/1874 | 28/10/1874  | 28/10/1874  | 28/10/1874 | 28/10/1874 | 28/10/1874 | 28/10/1874 | 28/10/1874 | 28/10/1874 |
| 119        | 29/10/1874 | 29/10/1874  | 29/10/1874  | 29/10/1874 | 29/10/1874 | 29/10/1874 | 29/10/1874 | 29/10/1874 | 29/10/1874 |
| 120        | 30/10/1874 | 30/10/1874  | 30/10/1874  | 30/10/1874 | 30/10/1874 | 30/10/1874 | 30/10/1874 | 30/10/1874 | 30/10/1874 |
| 121        | 31/10/1874 | 31/10/1874  | 31/10/1874  | 31/10/1874 | 31/10/1874 | 31/10/1874 | 31/10/1874 | 31/10/1874 | 31/10/1874 |
| 122        | 1/11/1874  | 1/11/1874   | 1/11/1874   | 1/11/1874  | 1/11/1874  | 1/11/1874  | 1/11/1874  | 1/11/1874  | 1/11/1874  |
| 123        | 2/11/1874  | 2/11/1874   | 2/11/1874   | 2/11/1874  | 2/11/1874  | 2/11/1874  | 2/11/1874  | 2/11/1874  | 2/11/1874  |
| 124        | 3/11/1874  | 3/11/1874   | 3/11/1874   | 3/11/1874  | 3/11/1874  | 3/11/1874  | 3/11/1874  | 3/11/1874  | 3/11/1874  |
| 125        | 4/11/1874  | 4/11/1874   | 4/11/1874   | 4/11/1874  | 4/11/1874  | 4/11/1874  | 4/11/1874  | 4/11/1874  | 4/11/1874  |
| 126        | 5/11/1874  | 5/11/1874   | 5/11/1874   | 5/11/1874  | 5/11/1874  | 5/11/1874  | 5/11/1874  | 5/11/1874  | 5/11/1874  |
| 127        | 6/11/1874  | 6/11/1874   | 6/11/1874   | 6/11/1874  | 6/11/1874  | 6/11/1874  | 6/11/1874  | 6/11/1874  | 6/11/1874  |
| 128        | 7/11/1874  | 7/11/1874   | 7/11/1874   | 7/11/1874  | 7/11/1874  | 7/11/1874  | 7/11/1874  | 7/11/1874  | 7/11/1874  |
| 129        | 8/11/1874  | 8/11/1874   | 8/11/1874   | 8/11/1874  | 8/11/1874  | 8/11/1874  | 8/11/1874  | 8/11/1874  | 8/11/1874  |
| 130        | 9/11/1874  | 9/11/1874   | 9/11/1874   | 9/11/1874  | 9/11/1874  | 9/11/1874  | 9/11/1874  | 9/11/1874  | 9/11/1874  |
| 131        | 10/11/1874 | 10/11/1874  | 10/11/1874  | 10/11/1874 | 10/11/1874 | 10/11/1874 | 10/11/1874 | 10/11/1874 | 10/11/1874 |
| 132        | 11/11/1874 | 11/11/1874  | 11/11/1874  | 11/11/1874 | 11/11/1874 | 11/11/1874 | 11/11/1874 | 11/11/1874 | 11/11/1874 |
| 133        | 12/11/1874 | 12/11/1874  | 12/11/1874  | 12/11/1874 | 12/11/1874 | 12/11/1874 | 12/11/1874 | 12/11/1874 | 12/11/1874 |
| 134        | 13/11/1874 | 13/11/1874  | 13/11/1874  | 13/11/1874 | 13/11/1874 | 13/11/1874 | 13/11/1874 | 13/11/1874 | 13/11/1874 |
| 135        | 14/11/1874 | 14/11/1874  | 14/11/1874  | 14/11/1874 | 14/11/1874 | 14/11/1874 | 14/11/1874 | 14/11/1874 | 14/11/1874 |
| 136        | 15/11/1874 | 15/11/1874  | 15/11/1874  | 15/11/1874 | 15/11/1874 | 15/11/1874 | 15/11/1874 | 15/11/1874 | 15/11/1874 |
| 137        | 16/11/1874 | 16/11/1874  | 16/11/1874  | 16/11/1874 | 16/11/1874 | 16/11/1874 | 16/11/1874 | 16/11/1874 | 16/11/1874 |
| 138        | 17/11/1874 | 17/11/1874  | 17/11/1874  | 17/11/1874 | 17/11/1874 | 17/11/1874 | 17/11/1874 | 17/11/1874 | 17/11/1874 |
| 139        | 18/11/1874 | 18/11/1874  | 18/11/1874  | 18/11/1874 | 18/11/1874 | 18/11/1874 | 18/11/1874 | 18/11/1874 | 18/11/1874 |
| 140        | 19/11/1874 | 19/11/1874  | 19/11/1874  | 19/11/1874 | 19/11/1874 | 19/11/1874 | 19/11/1874 | 19/11/1874 | 19/11/1874 |
| 141        | 20/11/1874 | 20/11/1874  | 20/11/1874  | 20/11/1874 | 20/11/1874 | 20/11/1874 | 20/11/1874 | 20/11/1874 | 20/11/1874 |
| 142        | 21/11/1874 | 21/11/1874  | 21/11/1874  | 21/11/1874 | 21/11/1874 | 21/11/1874 | 21/11/1874 | 21/11/1874 | 21/11/1874 |
| 143        | 22/11/1874 | 22/11/1874  | 22/11/1874  | 22/11/1874 | 22/11/1874 | 22/11/1874 | 22/11/1874 | 22/11/1874 | 22/11/1874 |
| 144        | 23/11/1874 | 23/11/1874  | 23/11/1874  | 23/11/1874 | 23/11/1874 | 23/11/1874 | 23/11/1874 | 23/11/1874 | 23/11/1874 |
| 145        | 24/11/1874 | 24/11/1874  | 24/11/1874  | 24/11/1874 | 24/11/1874 | 24/11/1874 | 24/11/1874 | 24/11/1874 | 24/11/1874 |
| 146        | 25/11/1874 | 25/11/1874  | 25/11/1874  | 25/11/1874 | 25/11/1874 | 25/11/1874 | 25/11/1874 | 25/11/1874 | 25/11/1874 |
| 147        | 26/11/1874 | 26/11/1874  | 26/11/1874  | 26/11/1874 | 26/11/1874 | 26/11/1874 | 26/11/1874 | 26/11/1874 | 26/11/1874 |
| 148        | 27/11/1874 | 27/11/1874  | 27/11/1874  | 27/11/1874 | 27/11/1874 | 27/11/1874 | 27/11/1874 | 27/11/1874 | 27/11/1874 |
| 149        | 28/11/1874 | 28/11/1874  | 28/11/1874  | 28/11/1874 | 28/11/1874 | 28/11/1874 | 28/11/1874 | 28/11/1874 | 28/11/1874 |
| 150        | 29/11/1874 | 29/11/1874  | 29/11/1874  | 29/11/1874 | 29/11/1874 | 29/11/1874 | 29/11/1874 | 29/11/1874 | 29/11/1874 |
| 151        | 30/11/1874 | 30/11/1874  | 30/11/1874  | 30/11/1874 | 30/11/1874 | 30/11/1874 | 30/11/1874 | 30/11/1874 | 30/11/1874 |
| 152        | 1/12/1874  | 1/12/1874   | 1/12/1874   | 1/12/1874  | 1/12/1874  | 1/12/1874  | 1/12/1874  | 1/12/1874  | 1/12/1874  |
| 153        | 2/12/1874  | 2/12/1874   | 2/12/1874   | 2/12/1874  | 2/12/1874  | 2/12/1874  | 2/12/1874  | 2/12/1874  | 2/12/1874  |
| 154        | 3/12/1874  | 3/12/1874   | 3/12/1874   | 3/12/1874  | 3/12/1874  | 3/12/1874  | 3/12/1874  | 3/12/1874  | 3/12/1874  |
| 155        | 4/12/1874  | 4/12/1874   | 4/12/1874   | 4/12/1874  | 4/12/1874  | 4/12/1874  | 4/12/1874  | 4/12/1874  | 4/12/1874  |
| 156        | 5/12/1874  | 5/12/1874   | 5/12/1874   | 5/12/1874  | 5/12/1874  | 5/12/1874  | 5/12/1874  | 5/12/1874  | 5/12/1874  |
| 157        | 6/12/1874  | 6/12/1874   | 6/12/1874   | 6/12/1874  | 6/12/1874  | 6/12/1874  | 6/12/1874  | 6/12/1874  | 6/12/1874  |
| 158        | 7/12/1874  | 7/12/1874   | 7/12/1874   | 7/12/1874  | 7/12/1874  | 7/12/1874  | 7/12/1874  | 7/12/1874  | 7/12/1874  |
| 159        | 8/12/1874  | 8/12/1874   | 8/12/1874   | 8/12/1874  | 8/12/1874  | 8/12/1874  | 8/12/1874  | 8/12/1874  | 8/12/1874  |
| 160        | 9/12/1874  | 9/12/1874   | 9/12/1874   | 9/12/1874  | 9/12/1874  | 9/12/1874  | 9/12/1874  | 9/12/1874  | 9/12/1874  |
| 161        | 10/12/1874 | 10/12/1874  | 10/12/1874  | 10/12/1874 | 10/12/1874 | 10/12/1874 | 10/12/1874 | 10/12/1874 | 10/12/1874 |
| 162        | 11/12/1874 | 11/12/1874  | 11/12/1874  | 11/12/1874 | 11/12/1874 | 11/12/1874 | 11/12/1874 | 11/12/1874 | 11/12/1874 |
| 163        | 12/12/1874 | 12/12/1874  | 12/12/1874  | 12/12/1874 | 12/12/1874 | 12/12/1874 | 12/12/1874 | 12/12/1874 | 12/12/1874 |
| 164        | 13/12/1874 | 13/12/1874  | 13/12/1874  | 13/12/1874 | 13/12/1874 | 13/12/1874 | 13/12/1874 | 13/12/1874 | 13/12/1874 |
| 165        | 14/12/1874 | 14/12/1874  | 14/12/1874  | 14/12/1874 | 14/12/1874 | 14/12/1874 | 14/12/1874 | 14/12/1874 | 14/12/1874 |
| 166        | 15/12/1874 | 15/12/1874  | 15/12/1874  | 15/12/1874 | 15/12/1874 | 15/12/1874 | 15/12/1874 | 15/12/1874 | 15/12/1874 |
| 167        | 16/12/1874 | 16/12/1874  | 16/12/1874  | 16/12/1874 | 16/12/1874 | 16/12/1874 | 16/12/1874 | 16/12/1874 | 16/12/1874 |
| 168        | 17/12/1874 | 17/12/1874  | 17/12/1874  | 17/12/1874 | 17/12/1874 | 17/12/1874 | 17/12/1874 | 17/12/1874 | 17/12/1874 |
| 169        | 18/12/1874 | 18/12/1874  | 18/12/1874  | 18/12/1874 | 18/12/1874 | 18/12/1874 | 18/12/1874 | 18/12/1874 | 18/12/1874 |
| 170        | 19/12/1874 | 19/12/1874  | 19/12/1874  | 19/12/1874 | 19/12/1874 | 19/12/1874 | 19/12/1874 | 19/12/1874 | 19/12/1874 |
| 171        | 20/12/1874 | 20/12/1874  | 20/12/1874  | 20/12/1874 | 20/12/1874 | 20/12/1874 | 20/12/1874 | 20/12/1874 | 20/12/1874 |
| 172        | 21/12/1874 | 21/12/1874  | 21/12/1874  | 21/12/1874 | 21/12/1874 | 21/12/1874 | 21/12/1874 | 21/12/1874 | 21/12/1874 |
| 173        | 22/12/1874 | 22/12/1874  | 22/12/1874  | 22/12/1874 | 22/12/1874 | 22/12/1874 | 22/12/1874 | 22/12/1874 | 22/12/1874 |
| 174        | 23/12/1874 | 23/12/1874  | 23/12/1874  | 23/12/1874 | 23/12/1874 | 23/12/1874 | 23/12/1874 | 23/12/1874 | 23/12/1874 |
| 175        | 24/12/1874 | 24/12/1874  | 24/12/1874  | 24/12/1874 | 24/12/1874 | 24/12/1874 | 24/12/1874 | 24/12/1874 | 24/12/1874 |
| 176        | 25/12/1874 | 25/12/1874  | 25/12/1874  | 25/12/1874 | 25/12/1874 | 25/12/1874 | 25/12/1874 | 25/12/1874 | 25/12/1874 |
| 177        | 26/12/1874 | 26/12/1874  | 26/12/1874  | 26/12/1874 | 26/12/1874 | 26/12/1874 | 26/12/1874 | 26/12/1874 | 26/12/1874 |
| 178        | 27/12/1874 | 27/12/1874  | 27/12/1874  | 27/12/1874 | 27/12/1874 | 27/12/1874 | 27/12/1874 | 27/12/1874 | 27/12/1874 |
| 179        | 28/12/1874 | 28/12/1874  | 28/12/1874  | 28/12/1874 | 28/12/1874 | 28/12/1874 | 28/12/1874 | 28/12/1874 | 28/12/1874 |
| 180        | 29/12/1874 | 29/12/1874  | 29/12/1874  | 29/12/1874 | 29/12/1874 | 29/12/1874 | 29/12/1874 | 29/12/1874 | 29/12/1874 |
| 181        | 30/12/1874 | 30/12/1874  | 30/12/1874  | 30/12/1874 | 30/12/1874 | 30/12/1874 | 30/12/1874 | 30/12/1874 | 30/12/1874 |
| 182        | 31/12/1874 | 31/12/1874  | 31/12/1874  | 31/12/1874 | 31/12/1874 | 31/12/1874 | 31/12/1874 | 31/12/1874 | 31/12/1874 |
| 183        | 1/1/1875   | 1/1/1875    | 1/1/1875    | 1/1/1875   | 1/1/1875   | 1/1/1875   | 1/1/1875   | 1/1/1875   | 1/1/1875   |
| 184        | 2/1/1875   | 2/1/1875    |             |            |            |            |            |            |            |



*Discussion* - The specimen n. 17726 (Pl. 1, fig. 11) was named *Cycadopteris brauniana* Zigno by Guiscardi. Because of the general leaf morphology, the pinnae morphology and their modality of insertion on the rachis, these two specimens are nonetheless attributed to the species *O. feistmantelii*.

*Otozamites molinianus* De Zigno, 1852  
Pl. 2, figs. 1-2

*Material studied* - Slabs n. 5760, 5773, 5774, 5806.

*Description* - This pinnate leaf fragments are almost completely preserved. The basal part is partially preserved only in sample n. 5806. The best-preserved and complete specimen (n. 5760) is composed of part and counterpart (Pl. 2, figs. 1-2) with a length of 16 cm and a maximum width of 3 cm in its middle portion. The leaf gradually narrows toward the apex and the basis. The rachis is completely covered by pinnae bases on the adaxial surface (n. 5760, 5773, 5774), gradually widening towards the middle part of the leaf to a maximum of nearly 5 mm. The linear pinnae are 20 mm long, 8 mm wide and are adaxially attached to the rachis; they are inserted alternatively, slightly overlapping at the base, with basiscopic basal margins commonly hidden under the acroscopic auricle of the neighbouring pinna on the opposite side. The apex is rounded. The veins are poorly preserved.

*Discussion* - *Otozamites molinianus* De Zigno resembles *O. mattiellianus* De Zigno in shape. *O. molinianus* has a rounded apex, while it is mucronate in *O. mattiellianus*; in the latter pinnules curve outwards, while in our specimens the pinnae are linear.

According to De Zigno (1864), the young pinnae of *O. molinianus* are characterized by an obtuse apex, while in adults pinnae have rounded apex. Therefore, the studied specimens seem to belong to adult pinnae.

*Otozamites* sp.  
Pl. 2, figs. 3-4

*Material studied* - Slab n. 5778.

*Description* - The part and counterpart of an entire linear, petiolate leaf of 14.5 cm length by and 2.4 cm

width, tapering gradually towards the base of the leaf while the leaf apex is missing. The petiole is up to 1.4 cm long and up to 4 mm wide. The rachis is strong, about 4 mm in width throughout the leaf fragment. The pinnae are alternate, adaxially and closely attached to the rachis. The shape of the pinnae changes from generally ovate and asymmetric at the base of the leaf, to more or less rounded and imbricate in the middle part, with a rounded apex. In the middle part of the leaf the pinnae reach a maximum length of 14 mm and width of 5 mm. Apically, the pinnae have a more or less auriculate acroscopic basal angle, while in basal pinnae it is moderately auriculate. The veins are well preserved and reach the pinna margins, sometimes bifurcate. The acroscopic veins curve acropetally, the basiscopic veins are invisible for the nearby pinnae cover them. In the counterpart of the specimen, the basiscopic veins are not preserved. The rachis is 4 mm wide and is completely covered by the pinnae.

*Discussion* - The leaf, resembling *Otozamites feistmantelii* De Zigno, especially in the pinna shape of the distal part of the leaf, has a clearly visible auricle on the acroscopic side, longer and wider than those of *O. feistmantelii*. The pinnae exhibit an imbricate pattern, covering the rachis with a rounded acroscopic and basiscopic margin, resembling those of *O. mattiellianus* De Zigno but with a rounded, and non-mucronate apex. The shape of the pinna is similar to *O. molinianus* De Zigno, pinnae are however smaller and bear a different venation. In the acroscopic margin, venation is more or less parallel to the rachis. The lack of other well-defined characteristics (venation), does not allow a specific definition for this specimen.

Genus *Ptilophyllum* Morris, 1840, emend. Harris,  
1969

*Ptilophyllum grandifolium* De Zigno, 1885  
Pl. 2, fig. 5

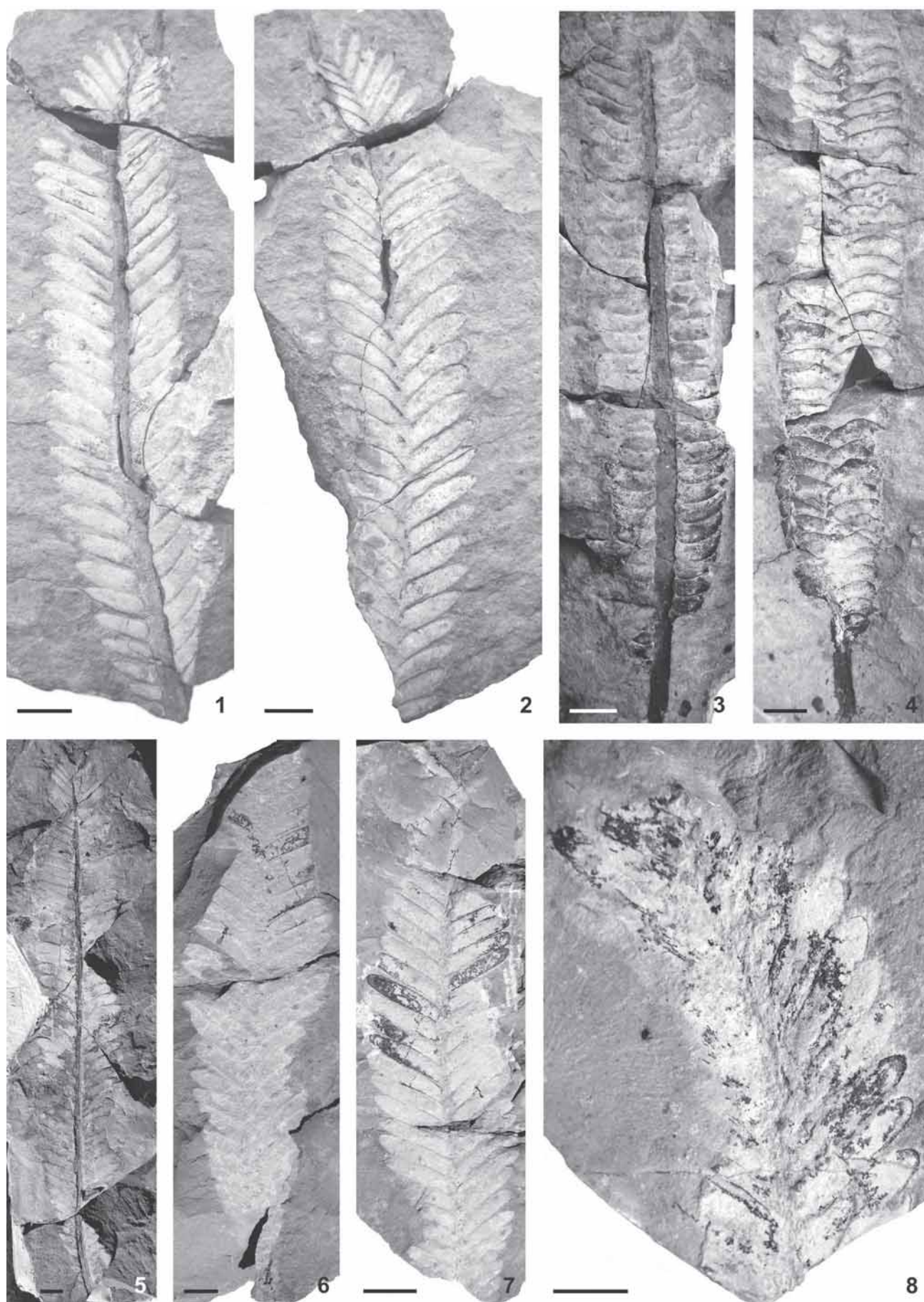
*Material studied* - Slabs n. 5758, 5759, 5764, 5769, 17727, 17728, 17729.

*Description* - Specimens n. 5759 and 17727 are part and counterpart, while specimens 17727 and 17728 are fragments of the same leaf. The leaves are pinnate, lanceolate, and gradually restricted towards base (n. 17729) and apex (n. 5769). The largest complete leaf

#### EXPLANATION OF PLATE 2

- figs. 1-2 - *Otozamites molinianus* Zigno, part and counterpart of pinnate leaf (n. 5760).  
figs. 3-4 - *Otozamites* sp., part and counterpart of linear pinnate leaf (n. 5778).  
fig. 5 - Pinnate leaf fragment of *Ptilophyllum grandifolium* Zigno (n. 5758).  
figs. 6-7 - *Ptilophyllum* sp., part and counterpart of an incomplete pinnate leaf (n. 5761 and 5762).  
fig. 8 - *Ptilophyllum* sp., pinnate leaf fragment (n. 5776).

Scale bar = 10 mm.



(specimen n. 5758) is 29 cm long and 4.4 cm wide. The main rachis is up to 5 mm wide. The petiole, preserved only in specimens n. 17729, 5764 and partially in n. 5758 (Pl. 2, fig. 5), is up to 5 cm long and 7 mm wide. The linear and narrow pinnae are up to 20 mm long and 6 mm wide and alternately inserted. The margins are parallel throughout most of the pinna length with a rounded apex. The veins are parallel, rarely bifurcating, and curve basipetally at the base.

*Discussion* - Specimens n. 5759 and 5769 were previously ascribed by Guiscardi to *Pachypteris visianica* and *Cycadopteris brauniana* De Zigno respectively, while the specimen n. 5769 was ascribed to *Laccopteris rotzoana* De Zigno, but with two question marks written beneath the main denomination (see Tab. 1).

*Ptilophyllum* sp.  
Pl. 2, figs. 6-8

*Material studied* - Slabs n. 5761, 5762, 5776.

*Description* - The specimen n. 5761 and 5762 are made up of part and counterpart of a leaf fragment 13.8 cm long and 4 cm wide, lacking the apex and petiole. The pinnae are up to 25 mm long and 6 mm wide and attached to the upper surface of the rachis with an angle of about 45-50° to the rachis. The margins are parallel for most of the length of the pinna. The apex is rounded, the basis is poorly preserved; veins are not visible.

*Discussion* - This specimen was previously attributed to *Pachypteris visianica* Zigno by Guiscardi. It is very similar in overall shape to the *Ptilophyllum grandifolium* species. Pinnae bear no auricles on the acroscopic margin and are attached to the adaxial surface of the rachis. Taken together, these two features rule out attribution of the specimen to the genera *Otozamites* and *Pterophyllum*, respectively. The features of the pinna base allow us to ascribe the specimens to the genus *Ptilophyllum*.

Class CONIFEROPSIDA  
Order CONIFERALES  
Family UNKNOWN

Genus *Brachyphyllum* Lindley and Hutton (1836) ex Brongniart, 1828

*Brachyphyllum* sp.  
Pl. 3, figs. 1-2

*Material studied* - Slabs n. 5753, 5764, 5794, 5795, 5797, 5798, 5805.

*Description* - Several branched shoots (specimens n. 5795, 5798, 5805) and four unbranched shoot fragments (n. 5753, 5764, 5794, 5797) have been found. The longest shoot (n. 5805) is up to 120 mm long and 9 mm wide (n. 5805; Pl. 3, fig. 1). All specimens are impressions and show the leaves arranged spirally. The smallest fragment (n. 5764) is an apical part of one shoot showing leaves 4 mm long and 4 mm wide.

*Discussion* - These are typical *Brachyphyllum* shoots with large leaf-base cushions and only a small free part of the leaf. As they are only impressions, no cuticular details are available; therefore it is impossible to determine the specimens at species level.

Genus *Pagiophyllum* Heer, 1881

*Pagiophyllum* cf. *veronense* Wesley, 1956  
Pl. 3, fig. 3

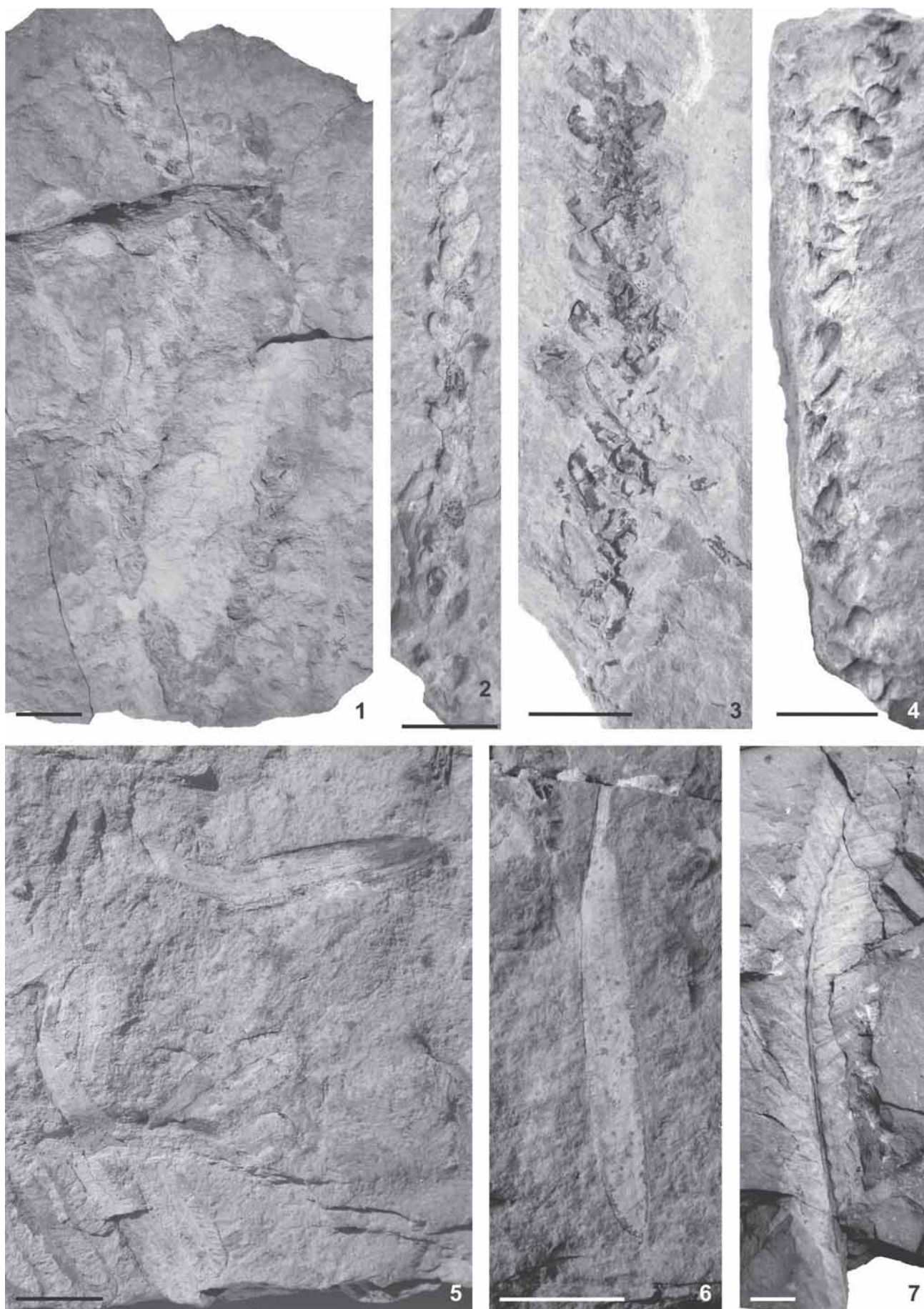
*Material studied* - Slab n. 5806.

*Description* - The fragment of unbranched leaf shoot is 60.6 mm long and 11 mm wide. The falcate leaves arise at an angle of approximately 45°. The upper part curves slightly forwards; the lower part continues without constriction to the leaf-base; the leaf is not flattened; 7 mm long and 3 mm wide at the medial portion of the shoot.

#### EXPLANATION OF PLATE 3

- fig. 1 - *Brachyphyllum* sp., branched shoot (n. 5805).
- fig. 2 - *Brachyphyllum* sp., unbranched shoot fragment (n. 5797).
- fig. 3 - *Pagiophyllum* cf. *veronense*, shoot fragment (n. 5806).
- fig. 4 - *Pagiophyllum* sp., shoot with helically arranged leaves (n. 5796).
- fig. 5 - *Desmiophyllum zeillerianum* (Zig.) Wesley and *Desmiophyllum rigidum* (Zig.) Wesley with a frond of *Cycadopteris brauniana* Zigno. (n. 5798).
- fig. 6 - *Desmiophyllum rigidum* (Zig.) Wesley (n. 5764).
- fig. 7 - Indeterminable leaf fragment (n. 5763).

Scale bar = 10 mm.



| N° Pal.<br>Mus. | N° Geol.<br>Mus. | Guiscardi determination                          | Revised determination                           |
|-----------------|------------------|--------------------------------------------------|-------------------------------------------------|
| 5749            | 1811             | <i>Sagenopteris goeppertiana</i>                 | Confirmed                                       |
| 5750            | 1812             | <i>Cycadopteris brauniana</i> Zigno              | Confirmed                                       |
| 5751            | 1814             | <i>Sagenopteris goeppertiana</i> Zigno           | Confirmed                                       |
| 5752            | 1815             | <i>Sagenopteris goeppertiana</i> Zigno           | Confirmed                                       |
| 5753            | 1816             | <i>Sagenopteris goeppertiana</i> Zigno           | Confirmed                                       |
| 5754            | 1818             | ---                                              | <i>Brachyphyllum</i> sp.                        |
| 5755            | 1818             | <i>Cycadopteris brauniana</i> Zigno              | Confirmed                                       |
| 5756            | 1819             | <i>Pachypteris angustifolia</i> (Zigno) Schimper | Confirmed                                       |
| 5757            | 1820             | <i>Pachypteris angustifolia</i> (Zigno) Schimper | <i>Dichopteris visianica</i> De Zigno           |
| 5758            | 1821             | <i>Ptilophyllum grandifolium</i> Zigno           | <i>Cycadopteris brauniana</i> De Zigno          |
| 5759            | 1822             | <i>Pachypteris Visianica</i> ? (Zigno) Sch       | Confirmed                                       |
| 5760            | 1823             | ---                                              | <i>Ptilophyllum grandifolium</i> De Zigno       |
| 5761            | 1824             | <i>Pachypteris Visianica</i> ? (Zigno) Sch       | <i>Cycadopteris brauniana</i> De Zigno          |
| 5762            | 1828             | <i>Pachypteris Visianica</i> ? (Zigno) Sch       | <i>Otozamites molinianus</i> De Zigno           |
| 5763            | 1829             | ---                                              | <i>Dichopteris visianica</i> De Zigno           |
| 5764            | 1833             | ---                                              | <i>Ptilophyllum</i> sp.                         |
| 5765            | 1836             | <i>Cycadopteris brauniana</i> Zigno              | <i>Ptilophyllum</i> sp.                         |
| 5766            | 1837             | <i>Otozamites feistmantelii</i> Zigno            | <i>Cycadopteris brauniana</i> De Zigno          |
| 5767            | 1838             | <i>Cycadopteris brauniana</i> Zigno              | <i>Otozamites molinianus</i> De Zigno           |
| 5768            | 1839             | <i>Cycadopteris brauniana</i> Zigno              | <i>Dichopteris visianica</i> De Zigno           |
| 5769            | 1840             | <i>Cycadopteris brauniana</i> Zigno              | <i>Ptilophyllum</i> sp.                         |
| 5770            | 1841             | <i>Laccopteris rotzoana</i> Zigno ??             | <i>Cycadopteris brauniana</i> De Zigno          |
| 5771            | 1844             | <i>Cycadopteris brauniana</i> Zigno              | Confirmed                                       |
| 5772            | 1845             | <i>Cycadopteris brauniana</i> Zigno              | Confirmed                                       |
| 5773            | 1847             | <i>Otozamites molinianus</i> Zigno               | Confirmed                                       |
| 5774            | 1848             | <i>Otozamites molinianus</i> Zigno               | Confirmed                                       |
| 5775            | 1849             | <i>Cycadopteris brauniana</i> Zigno              | Confirmed                                       |
| 5776            | 1851             | ---                                              | <i>Ptilophyllum</i> sp.                         |
| 5777            | 1852             | <i>Cycadopteris brauniana</i> Zigno              | Confirmed                                       |
| 5778            | 1854             | ---                                              | <i>Otozamites</i> sp.                           |
| 5779            | 1856             | <i>Otozamites bunburanus</i>                     | <i>Otozamites</i> cf. <i>bunburanus</i>         |
| 5780            | 1857             | <i>Cycadopteris Heerii?</i> Zigno                | <i>Cycadopteris brauniana</i> De Zigno          |
| 5781            | 1862             | <i>Otozamites bunburanus</i> Zigno               | Confirmed                                       |
| 5782            | 1862             | <i>Cycadopteris Heerii</i> Zigno                 | <i>Cycadopteris brauniana</i> De Zigno          |
| 5783            | 1863             | <i>Cycadopteris brauniana</i> Zigno              | Confirmed                                       |
| 5784            | 1863             | <i>Cycadopteris Heerii?</i> Zigno                | <i>Cycadopteris brauniana</i> De Zigno          |
| 5785            | 1864             | <i>Cycadopteris brauniana</i> Zigno              | Confirmed                                       |
| 5786            | 1866             | <i>Cycadopteris Heerii</i> Zigno                 | <i>Cycadopteris brauniana</i> De Zigno          |
| 5787            | 1867             | ---                                              | Not determinable                                |
| 5788            | 1869             | <i>Cycadopteris brauniana</i> Zigno              | Confirmed                                       |
| 5789            | 1871             | ---                                              | <i>Cycadopteris brauniana</i> De Zigno          |
| 5790            | 1873             | <i>Cycadopteris brauniana?</i> Zigno             | <i>Cycadopteris brauniana</i> De Zigno          |
| 5791            | 1874             | <i>Cycadopteris brauniana</i> Zigno              | Confirmed                                       |
| 5792            | 1875             | <i>Cycadopteris Heerii</i> Zigno                 | <i>Cycadopteris brauniana</i> De Zigno          |
| 5793            | 1876             | ---                                              | Not determinable                                |
| 5794            | 1878             | <i>Otozamites bunburanus</i> Zigno               | <i>Brachyphyllum</i> sp.                        |
| 5795            | 1879             | ---                                              | <i>Brachyphyllum</i> sp.                        |
| 5796            | 1880             | <i>Otozamites Massalongianus</i> Zigno           | <i>Pagiophyllum</i> sp.                         |
| 5797            | 1881             | <i>Otozamites Bunburianus</i> Zigno              | <i>Brachyphyllum</i> sp.                        |
| 5798            | 1882             | ---                                              | <i>Cycadopteris brauniana</i> De Zigno          |
| 5799            | 1887             | <i>Cycadopteris brauniana</i> Zigno              | <i>Desmiophyllum rigidum</i> (Zig.) Wesley      |
| 5800            | 1888             | <i>Cycadopteris brauniana</i> Zigno              | <i>Desmiophyllum zeillerianum</i> (Zig.) Wesley |
| 5801            | ---              | <i>Cycadopteris Heerii?</i> Zigno                | <i>Brachyphyllum</i> sp.                        |
| 5802            | ---              | ---                                              | <i>Cycadopteris brauniana</i> De Zigno          |
| 5803            | ---              | ---                                              | <i>Cycadopteris brauniana</i> De Zigno          |
| 5804            | ---              | ---                                              | <i>Cycadopteris brauniana</i> De Zigno          |
| 5805            | ---              | ---                                              | <i>Cycadopteris brauniana</i> De Zigno          |
| 5806            | ---              | ---                                              | <i>Brachyphyllum</i> sp.                        |
|                 |                  |                                                  | <i>Otozamites molinianus</i> De Zigno           |
|                 |                  |                                                  | <i>Pagiophyllum</i> cf. <i>veronense</i>        |

Tab. 1 - Summary of the taxa represented in the Collection of fossil plants from Roverè di Velo.

| N° Pal. Mus. | N° Geol. Mus. | Guiscardi determination                | Revised determination                     |
|--------------|---------------|----------------------------------------|-------------------------------------------|
| 5807         | ---           | ---                                    | <i>Cycadopteris brauniana</i> De Zigno    |
| 5808         | ---           | ---                                    | <i>Dichopteris cf. rhomboidalis</i>       |
| 5809         | ---           | ---                                    | <i>Cycadopteris brauniana</i> De Zigno    |
| 5810         | ---           | ---                                    | Not determinable                          |
| 17724        | 1842          | <i>Cycadopteris brauniana</i> Zigno    | Confirmed                                 |
| 17725        | 1843          | <i>Cycadopteris brauniana</i> Zigno    | Confirmed                                 |
| 17726        | 1855          | <i>Cycadopteris brauniana</i> Zigno    | <i>Otozamites feistmantelii</i> De Zigno  |
| 17727        | 1858          | <i>Ptilophyllum grandifolium</i> Zigno | Confirmed                                 |
| 17728        | ---           | ---                                    | <i>Cycadopteris brauniana</i> De Zigno    |
| 17729        | ---           | <i>Ptilophyllum grandifolium</i>       | Confirmed                                 |
| 17730        | 1813          | <i>Sagenopteris</i>                    | <i>Sagenopteris goeppertiana</i> De Zigno |

Tab. 1 - continue.

The upper side is 5.0 mm long, with a blunt apex; the lower surface is more convex than the upper surface.

*Discussion* - In terms of Wesley's diagnosis (1956), the lack of cuticle prevents observation of the microscopic features of the specimens. On the base of the macromorphology, the specimen is nonetheless attributed with reservations to the species *P. veronense*.

*Pagiophyllum* sp.  
Pl. 3, fig. 4

*Material studied* - Slabs n. 5764, 5796.

*Description* - The slender branched shoots with leaves spirally arranged (Pl. 3, fig. 4) are respectively 6.4 cm long and 5 mm wide (n. 5796) and 5.5 cm long and 1.1 cm wide (n. 5764). Leaves are 5 mm long and 2 mm wide, sometimes imbricate. They are more or less closely spaced and detached from the axis especially at the middle part of the main shoot. The leaves with obtuse apex in sample n. 5764 are 10 mm long and 5 mm wide and are closely inserted around the axes. The leaves are blunt at the apex. The specimens are just impressions with little organic material remaining. In the middle part of the main rachis the leaves on the left side (n. 5796) are not preserved.

*Discussion* - Guiscardi erroneously named the specimen (n. 5796) *Otozamites Massalongianus* Zigno, probably confusing the overlapping appearance and the *Otozamites*-like shape of the leaves of the apical portion of the main shoot. Their poor state of preservation does not enable us to ascribe the specimens at species level, but the leaf length is greater than its width, which allows us to place these shoots in the form genus *Pagiophyllum*.

Class GINKGOOPSIDA (?)  
Family GINKGOACEAE (?)

Genus *Desmiophyllum* Lesquereux, 1878

*Desmiophyllum zeillerianum* De Zigno (Zig.) Wesley,  
1958  
Pl. 3, fig. 5

*Material studied* - Slab n. 5798.

*Description* - One specimen, in a bad state of preservation, can be attributed to this species. It is an incomplete leaf lacking the apex. It is 41 mm long and 5 mm wide, strap-shaped, gradually narrowing towards the base and then widening again slightly at the attachment; the margin is entire. In the distal part of the leaf, some veins can be barely counted (10?), strongly marked, equidistant, more or less parallel.

*Discussion* - This species was first instituted by De Zigno (1856-85) for seven specimens collected from the Calcarei Grigi limestone in the Valle Zuliani, near Roverè di Velo. He ascribed these specimens, with reservations, to the *Podozamites* genus and named them *Podozamites zeillerianus*. Later, Wesley (1958) was unable to see any trace of the veins dichotomising at any point as they run from the base to the apex of the leaf. Therefore, Wesley (1958) thought it best to transfer the specimens to *Desmiophyllum*.

*Desmiophyllum rigidum* (Zig.) Wesley, 1958  
Pl. 3, fig. 6

*Material studied* - Slabs n. 5764, 5798.

*Description* - This species is represented in the collection by two straight leaves narrowing gradually towards the base and slightly widening at the attachment

area (n. 5764). Specimen n. 5798 lacks the petiole. They have an acute apex and entire margin. They are 37 mm long and 4 mm wide (n. 5764) and 28 mm long and 5 mm wide (n. 5798). Three veins (n. 5798) more or less parallel extend in full length along the lamina; they are unbranched and equidistant. The specimen n. 5764 does not show any vein.

*Discussion* - Wesley (1958) suggested using *Desmiophyllum rigidum* instead of *Podozamites rigidum*, as it was difficult to know whether the examined specimens represented the detached pinnae of a compound leaf or they were entire leaves, instead.

#### SPECIMEN NOT DETERMINABLE

Pl. 3, fig. 7

*Material studied* - Slab n. 5763.

*Description* - Specimen n. 5763 (12.7 cm long and 2.2 cm wide) is a nearly complete pinna with the abaxial surface exposed, lacking the distal part, with the proximal part of the petiole hardly visible. The pinnules have a rounded apex; the base of the pinnule is enlarged especially in the distal part of the pinna; the point of attachment of the pinnule to the pinna rachis is invisible. The venation is not preserved (Pl. 3, fig. 7).

*Discussion* - Due to the bad preservation of specimen no systematic attribution is possible.

#### CONCLUSIONS

The present paper deals with samples from the "classic" flora of the "Calcarei Grigi del Veneto". In his study, De Zigno (1856-1885) concentrated his observations on the macroscopic features of specimens. In fact, only in 1850 were considerable studies of plant cuticles carried out and published in the palaeobotanical literature during the second half of the 20<sup>th</sup> century (Kerp, 1990).

The specimens of this study are preserved as impressions. No cuticle remains were found; the identification of fossil plants is based on the external morphology of the specimens only.

Because of the poor preservation of the specimens, only part of them could be assigned at species level. However, the classification carried out in the second half of the XIX century has been completely revised and updated (Tab. 1).

The collection contains the following genera: *Cycadopteris* De Zigno, 1853; *Dichopteris* De Zigno, 1853; *Sagenopteris* Presl, 1838; *Otozamites* Braun, 1843; *Ptilophyllum* Morris, 1840; *Pagiophyllum* Heer, 1881; *Brachyphyllum* Brongniart, 1828; *Desmiophyllum* Lesquereux, 1878. The taxonomic changes compared with the Guiscardi catalogue are listed in Tab. 1.

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