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SYSTEMATIC REVISION OF THE CHLAMYDINAE  
(PECTINIDAE, BIVALVIA, MOLLUSCA)  
OF THE EUROPEAN CRETACEOUS  
PART 4 : MERKLINIA

BY

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(With two plates)

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ABSTRACT

This paper is the fourth of a series dealing with the systematic revision of the European Cretaceous *Chlamydinæ* (*Pectinidae*, *Bivalvia*, *Mollusca*). Two European and one Tethyan species of the genus *Merklinia* SOBETZKI, 1960 (*M. aspera* (LAMARCK, 1819), *M. variabilis* (VON HAGENOW, 1842), *M. perornata* (COTTREAU, 1922)) are described.

RESUME

Ce travail est la quatrième partie d'une série traitant de la révision systématique des *Chlamydinæ* (*Pectinidae*, *Bivalvia*, *Mollusca*) du Crétacé européen et africain. Deux espèces européennes et une du domaine de la Téthys du genre *Merklinia* SOBETZKI, 1960 (*M. aspera* (LAMARCK, 1819), *M. variabilis* (VON HAGENOW, 1842), *M. perornata* (COTTREAU, 1922)) sont décrites.

## ZUSAMMENFASSUNG

Dieser Arbeit ist der vierte in einer Serie von systematischen Revisionen der europäischen und afrikanischen Kreide *Chlamydiae* (*Pectinidae*, *Bivalvia*, *Mollusca*). Zwei europäischen und eine Tethys-Art der Gattung *Merklinia* SOBETZKI, 1960 (*M. aspera* (LAMARCK, 1819), *M. variabilis* (VON HAGENOW, 1842), *M. perornata* (COTTREAU, 1922)) sind beschrieben.

## INTRODUCTION

The present paper is the fourth of a series on the subfamily *Chlamydiae* (cf. DHONDT, A. V. 1972 a and 1972 b, 1973).

*Merklinia* SOBETZKI, 1960 is discussed as a genus and an emended diagnosis is given. Three species are described.

The methods and the aims are described in DHONDT, A. V. 1972 a (p. 2).

One species formerly described as a « *mutatio* » is given species rank (*M. perornata*).

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#### SYSTEMATIC DESCRIPTIONS

#### Abbreviations

See in DHONDT, A. V. 1972 a (p. 4) and in 1973 (p. 4).

#### Additional Abbreviations

R. E. : Ruhrlandmuseum Essen/Ruhr, G. F. R.

Hann. : Geologisches Landesamt für Bodenforschung, Hanover, G. F. R.

## Signs in Synonymy Lists

See in DHONDT, A. V. 1972 a (p. 5).

## Family PECTINIDAE RAFINESQUE

Subfamily CHLAMYDINAE VON TEPPNER, 1922 em. SOBETZKI, 1961

Genus *Merklinia* SOBETZKI, 1960

Type species : *Pecten asper* LAMARCK, 1819 (O. D.).

Emended diagnosis (1) : Acline, rounded-triangular to almost orbicular, equilateral shells; the umbo is straight; the apical angle varies from approximately 75°, on small specimens, to 120°, on large ones; the auricles are relatively small : the anterior auricle of the right valve has a byssal sinus that is relatively shallower on large than on small specimens; the other auricles are almost right-angled and subequal; the macrosculpture consists of well developed spine-bearing ribs (10 to 20) which are subdivided into a varying number of side-riblets : extreme subdivision of the ribs near the pallial margins results in an intricate structure of lobes of various degrees at this margin; lunulate areas are present at both sides of the umbo; they are covered with fine striae (pl. II, fig. 2B).

SOBETZKI considered *Merklinia* as a subgenus of *Chlamys* (1960, p. 67).

In DHONDT, A. V. 1973 (p. 4) I redefine *Chlamys* and the related genus *Mimachlamys*.

— *Merklinia* differs :

- from *Chlamys* in having an almost suborbicular rather than an elongated-ovoid shape, and in having a generally much wider apical angle and subequal auricles;
- from *Mimachlamys* in being more orbicular, in having fewer and more complex strongly developed ribs and subequal auricles. However, shape (orbicular or elongated) and apical angles (narrow versus wide) as differentiating characteristics are to be used with caution : in most *Chlamydiae* smaller (younger) specimens have a more elongated shape and a narrower apical angle than larger (older) specimens. This can be shown for two *Merklinia* species by taking into consideration the smallest, the largest and the average specimen in each sample :

(1) The original diagnosis by SOBETZKI is a description of the type-species and is not applicable to any other species included in the genus by that author.

*M. aspera* :

## Tourtia de Tournai :

| U. P. D.    | W.      | A. A.  | U. P. D./W.      |
|-------------|---------|--------|------------------|
| 12.5 mm     | 11.5 mm | 87.0°  | 1.08686          |
| 73.0 mm     | 78.0 mm | 107.0° | 0.93559          |
| av. 51.6 mm | 52.0 mm | 99.6°  | 0.99231 (n = 13) |

## Warminster - Upper Greensand :

|             |         |      |                  |
|-------------|---------|------|------------------|
| 15.7 mm     | 14.4 mm | 83°  | 1.09027          |
| 92.0 mm     | 96.8 mm | 104° | 0.95041          |
| av. 51.1 mm | 52.1 mm | 98°  | 0.98062 (n = 23) |

*M. variabilis* :

## Upper Maastrichtian, Sint Pietersberg :

|            |         |     |                  |
|------------|---------|-----|------------------|
| 7.4 mm     | 5.9 mm  | 73° | 1.25423          |
| 12.3 mm    | 11.4 mm | 88° | 1.07894          |
| av. 9.8 mm | 8.4 mm  | 83° | 1.16666 (n = 12) |

— *Merklinia* also differs from *Chlamys* in having a very complex rib-structure. In the *Chlamys* species that have a relatively intricate rib-structure (*Chlamys faujasi* (DEFRANCE), *Chl. elongata* (LAMARCK), see in DHONDT, A. V. 1973, pp. 6-28) the pallial margin is more or less in one plane; and in *Chlamys* species there is a very deep and probably functional byssal sinus.

Within the *Chlamydinæ*, *Merklinia* could also be compared to *Lyropecten* (*Aequipecten*) or *Chlamys* (*Aequipecten*) (Treatise on Invertebrate Paleontology, p. N 355). This last assimilation I consider to be incorrect because in *Aequipecten* left and right valves have differently sculptured ribs and intercostal intervals; their auricles are very rarely right-angled, but always have on the anterior side of the right valve a relatively deep and functional byssal notch and never lunulate areas.

However, *Lyropecten* (*Aequipecten* ?) *ternatus* (MUNSTER in GOLDFUSS) (see DHONDT, A. V., 1972b, p. 42, pl. II, III) has a ribstructure almost as intricate as that of *Merklinia*.

*Merklinia* has different characteristics from all other Cretaceous *Chlamydinæ* and should therefore be considered as a separate genus.

Whether, as SOBETZKI, V. A. 1960 (p. 68) thinks, the ancestry of *Merklinia* lies within the *Aequipecten fibrosus* group, I cannot decide for lack of comparative material.

No possible descendants of *Merklinia* are known from Tertiary strata; *Pectinidae* are rare in Paleocene European strata and none of them are comparable with *Merklinia*.

*Merklinia aspera* (J. B. LAMARCK, 1819)

(Pl. I, Fig. 1a, 1b)

- |                                                              |                                          |
|--------------------------------------------------------------|------------------------------------------|
| . 1813 — <i>Pecten scaber</i>                                | R. PULTENEY, p. 107, f. 4 of pl.         |
| . 1813 — <i>Pecten triplicatus</i>                           | R. PULTENEY, p. 108, f. 5 of pl.         |
| v . 1819 — <i>Pecten asper</i>                               | J. B. LAMARCK, p. 180, n° 8.             |
| . 1820 — <i>Pectinites asper</i>                             | E. T. VON SCHLOTHEIM, p. 226.            |
| 1822 — <i>Pecten asper</i>                                   | J. DE C. SOWERBY, p. 95, pl. 370, f. 1.  |
| 1822 — <i>Pecten asper</i> Lam.                              | A. BRONGNIART, p. 320, 603, pl. 5, f. 1. |
| . 1825 — <i>Pecten asper</i> Lamk.                           | M. DEFRANCE, p. 261.                     |
| 1832 — <i>Pecten asper</i>                                   | G. P. DESHAYES, p. 728.                  |
| v . 1833 — <i>Pecten asper</i> Lamk.                         | A. GOLDFUSS, p. 38, pl. 94, f. 1 A-C.    |
| ? 1837 — <i>Pecten asper</i> Lam.                            | F. DUJARDIN, p. 228.                     |
| (1837) — <i>Pecten asper</i> var. <i>minor</i><br>Al. Brong. | A. D'ARCHIAC, p. 187.                    |
| (1839) — <i>Pecten asper</i>                                 | A. D'ARCHIAC, p. 287, 301, 305.          |
| 1839 — <i>Pecten asper</i> Lamk.                             | H. B. GEINITZ, p. 23.                    |
| 1841 — <i>Pecten asper</i> Lamck.                            | F. A. ROEMER, p. 53.                     |
| . 1846 — <i>Pecten asper</i> Lamarck                         | A. E. REUSS, p. 30, pl. 40, f. 1.        |
| . 1846 — <i>Pecten asper</i> Lam.                            | H. B. GEINITZ, p. 469.                   |
| v . 1847 — <i>Pecten asper</i> Lamarck                       | A. D'ORBIGNY, p. 599, pl. 434, f. 1-6.   |
| (1849) — <i>Pecten asper</i> Lk.                             | H. G. BRONN, p. 920.                     |
| (1850) — <i>Pecten asper</i> Lamarck                         | H. B. GEINITZ, p. 184.                   |
| (1850) — <i>Pecten asper</i> Lam.                            | A. D'ORBIGNY, p. 168, n° 475.            |
| 1852 — <i>Pecten asper</i> Lam.                              | R. KNER, p. 317, pl. 17, f. 6.           |
| (1854) — <i>Pecten asper</i> Lam.                            | J. MORRIS, p. 175.                       |
| (1855) — <i>Pecten asper</i> Lam.                            | G. COTTEAU, p. 116.                      |
| (1857) — <i>Pecten asper</i> Lam.                            | H. COQUAND, p. 57, 62.                   |
| 1863 — <i>Pecten asper</i> Lam.                              | A. KUNTH, p. 724.                        |
| (1866) — <i>Pecten asper</i> Lamck.                          | C. GIEBEL, p. 48.                        |

- (1868) — *Pecten asper* Lamk. P. M. DUNCAN, p. 46.  
v . 1870 — *Pecten asper* Lamarck F. J. PICTET & G. CAMPICHE,  
pp. 208-209.  
(1871) — *Pecten (Chlamys) asper*  
Lam. F. STOLICZKA, p. 428.  
v . 1872 — *Pecten asper* Lamarck H. B. GEINITZ, p. 198.  
(1875) — *Pecten asper* Lamk. F. L. CORNET & A. BRIART,  
p. 118.  
1876 — *Pecten asper* H. DEICKE, p. 26.  
(1877) — *Pecten asper* Lam. DE COSSIGNY, p. 323.  
v . 1878 — *Chlamys asper* (laps. cal.)  
Lamarck E. BAYLE, pl. 122, f. 1.  
1893 — *Pecten asper* Lam. R. MICHAEL, p. 234.  
(1897) — *Pecten asper* Lam. W. F. HUME, p. 550.  
(1897) — *Pecten (Chlamys) asper*  
Lam. W. F. HUME, p. 559, 564.  
(1901) — *Pecten asper* Lam. A. MICHALET, p. 589.  
(1901) — *Pecten asper* J. CORNET, p. B.56, B.58.  
v . 1902 — *Pecten (Aequipecten)*  
*asper* Lamarck H. WOODS, pp. 186-188, pl.  
35, f. 12, pl. 36, f. 1 a-b,  
2-4.  
(1904) — *Pecten asper* J. J. JAHN, p. 298.  
. 1911 — *Pecten asper* Lamk. A. FRITSCH, p. 45, f. 204.  
1913 — *Pecten asper* Lam. P. N. TSCHIRWINSKY, p. 39.  
v . 1918 — *Pecten asper* Lam. J. FAVRE, pl. 9.  
(1929) — *Pecten (Chlamys) asper* C. P. NICOLESCO, p. 772.  
(1931) — *Pecten asper* Lam. B. KOKOZYNSKA, p. 668.  
(1931) — *Pecten asper* A. BENOIT, p. 79.  
1933 — *Pecten (Chlamys) asper*  
Lam. W. HAENTZSCHEL, p. 127.  
v . 1939 — *Pecten (Aequipecten)*  
*asper* Lam. E. DACQUE, p. 45, pl. 2, f. 4,  
pl. 3, f. 1.  
v . 1939 — *Pecten (Chlamys)*  
*saxonicus* E. DACQUE, p. 48, pl. 4, f. 6.  
(1939) — *Pecten (Aequipecten)*  
*asper* Lam. R. MARLIERE, p. 245.  
. 1940 — *Chlamys (Aequipecten)*  
*scabra* (Pulteney) L. R. COX, p. 125, pl. 7, f. 4,  
5.  
(1957) — *Chlamys Asper* d'Orb. L. CAYEUX, p. 13.  
(1958) — *Chlamys asper* d'Orb. L. CAYEUX, p. 11.  
(1959) — *Chlamys asper* S. FABRE-TAXY, p. 164.  
. 1961 — *Chlamys (Merklina)*  
*aspera* (Lamarck) V. A. SOBETZKI, pp. 38-40,  
pl. 3, f. 7-10, pl. 4, f. 1-4.  
(1964)c — *Pecten (Aequipecten)*  
*asper* Lam. H. ARNOLD, p. 317.  
(1966) — *Pecten asper* Lam. J. SVOBODA *et al.*, p. 493.





|                        |     |
|------------------------|-----|
| British Cenomanian     | 118 |
| Czech Cenomanian       | 4   |
| East German Cenomanian | 7   |
| French Cenomanian      | 105 |
| Polish Cenomanian      | 10  |
| Ukrainian Cenomanian   | 3   |
| West German Cenomanian | 112 |
| Belgian Turonian       | 26  |
| East German Turonian   | 4   |
| French Turonian        | 10  |
| West German Turonian   | 2   |

### Measurements :

— Tourtia de Tournai : Cenomanian specimens from Hainaut in Belgium :

|           |                                                    |
|-----------|----------------------------------------------------|
| U. P. D.  | varies from 12.5 mm to 77 mm; av. 51.6 mm (n = 13) |
| W.        | varies from 11.5 mm to 92 mm; av. 56.1 mm (n = 19) |
| A. A.     | varies from 87° to 108°; av. 99.3° (n = 12)        |
| Ribnumber | varies from 15 to 22; av. 18.7 (n = 19)            |

— Warminster, Great Britain (Upper Greensand) :

|           |                                                       |
|-----------|-------------------------------------------------------|
| U. P. D.  | varies from 15.4 mm to 92.0 mm; av. 51.55 mm (n = 24) |
| W.        | varies from 14.4 mm to 96.8 mm; av. 56.20 mm (n = 32) |
| A. A.     | varies from 83° to 111°; av. 99.0° (n = 30)           |
| Ribnumber | varies from 15 to 18; av. 16.5 (n = 31)               |

— Shaftesbury, Great Britain (Cenomanian) :

| U. P. D. | W.      | A. A. | Ribnumber |
|----------|---------|-------|-----------|
| —        | —       | —     | —         |
| —        | 68.7 mm | —     | 18        |
| —        | 74.5 mm | —     | 17        |
| —        | —       | —     | 16        |
| 69.2 mm  | 71.6 mm | 104°  | 17        |
| 45.1 mm  | 44.1 mm | 95.5° | 14        |

— Wilmington, Great Britain (Cenomanian) :

| U. P. D. | W.      | A. A. | Ribnumber |
|----------|---------|-------|-----------|
| —        | —       | —     | —         |
| —        | 53.8 mm | —     | —         |
| 89.6 mm  | —       | 111°  | 18        |
| 89.6 mm  | —       | 110°  | 17        |

| U. P. D. | W.      | A. A. | Ribnumber |
|----------|---------|-------|-----------|
| —        | —       | —     | —         |
| 58.4 mm  | —       | 102°  | 18        |
| 72.4 mm  | 74.4 mm | —     | —         |
| 79.2 mm  | 81.3 mm | 102°  | —         |
| 79.2 mm  | 81.3 mm | 105°  | —         |
| —        | 60.7 mm | 108°  | 16        |

Note : usually U. P. D. > W. on small specimens;  
 U. P. D. = W. on medium sized specimens;  
 U. P. D. < W. on large specimens.

The averages stated above for specimens from the Tourtia of Tournai and from the Upper Greensand in Warminster give an incorrect idea; they are too high for W. values : many large specimens miss the umbonal region and their U. P. D. cannot be measured when their W. still can, and this explains the higher W. values.

#### Description :

**Diagnosis.** — *Merklinia*-species covered with 12-22 radial ribs, subdivided into many side-riblets with small scales or spines. At the apical margins well developed striated lunulate areas are present; the striae are perpendicular to the U. P. D. axis of the shell. Both valves are rather convex, the right valve rather more so than the left.

The ribs are angular and equal in shape on both valves; near the umbo they are undivided; further away from it side-riblets appear on the ribs; their number can reach five per rib side; on the valve, considered as a whole, there is no uniformity in this respect; all ribs are covered with spinules of different sizes and in varying number; on small valves these spinules are relatively larger than on larger valves; they are more scale-like than spine-like on right valves.

The intercostal intervals are smooth, except for poorly developed concentric growthlines.

On small valves the intervals are relatively broader than on larger valves, because on the former the ribs are undivided, whereas on the latter they are subdivided and thus the intervals seem narrower.

Almost all auricles are right-angled; the anterior auricle of the right valve has a shallow byssal sinus; all auricles are covered with a varying number of radial, spinule bearing riblets.

The lunulate areas are well developed and are as long as the apical margins; they follow the base of the auricles and end at the umbo. They are present at the anterior and posterior side of the shell and on both

valves; the lunulate areas of the right and left valves are the reflection of each other and the striae which cover them seem to continue from one valve to the next.

### Discussion

#### Variability :

The ribnumber in *Merklinia aspera* is fairly variable; this can be explained partly by the difficulty there is in counting the ribs when they are strongly subdivided : side-riblets are, on some valves, almost as strongly developed as the principal ribs. Small specimens of *M. aspera* have almost no side-riblets : in the Musée géologique in Lausanne and in the Muséum d'Histoire naturelle in Geneva there are a few specimens which have only one side-riblet on each side of the principal ribs; on these specimens the spinules of the principal ribs are much more developed than those of the accompanying side-riblets or than those of principal ribs on larger valves.

#### Synonymy :

For *Pecten scaber* and *P. triplicatus* PULTENEY, 1813 see COX, L. R. 1940 (p. 125). Apart from this, *Merklinia aspera* is such a typical species that no confusion has arisen in the literature.

As for *Pecten (Chlamys) saxonicus* E. DACQUÉ *non* SCUPIN, it is difficult to reach a conclusion because the original specimen is a steinkern without trace of ribornamentation (2).

#### Differentiation :

It is easy to differentiate *Merklinia aspera* from the other *Merklinia* species, by the higher ribnumber of the former.

#### Stratigraphical and geographical distribution :

Albian : GREAT BRITAIN :

##### *dispar*-zone :

Haldon, Devon (B. M.)

Holworth House Cliffs, Dorset (B. M.)

Middle of North Dintar Pit, Wilts. (B. M.)

Punfield, Dorset (B. M.)

Rock Cottages, Evershott, Dorset (B. M.)

(2) *Pecten saxonicus* SCUPIN, 1913 : the original of this species is a poorly preserved specimen kept in the Martin-Luther-Universität-Halle-Wittenberg, Halle an der Saale (G. D. R.).

## SWITZERLAND :

La Vraconnaz, Ste-Croix, Vaud (Mus. Laus.)

## Cenomanian : BELGIUM :

Tourtia de Tournai :

Montignies-sur-Roc (I. R. Sc. N. B., U. C. L.)

Tournai (I. R. Sc. N. B., R. U. G.)

Meule de Bernissart :

Bernissart (I. R. Sc. N. B.)

## CZECHOSLOVAKIA :

Pankratz (DR.)

Tyssa (DR.)

## FRANCE :

Argers, Sainte-Ménéhould, Marne (Ec. Min.)

Auberville, Calvados (B. M.)

Brionne, Eure (Mus. Gen.)

Bruneval, Calvados (U. C. L.)

Cabaresse, Pont-Saint-Esprit, Gard (B. M.)

Cap de la Hève, Seine-Maritime (B. M., DR., U. C. L.)

Caussols, Var (Musé, Coll. D'ORBIGNY)

Cauville, Calvados (U. C. L.)

Charny, Yonne (Mus. Gen.)

Cherré, Sarthe (Mus. Gen.)

Coulanges, Les Sablons, Orne (Ec. Min.)

Darnetel, Calvados (U. C. L.)

Dives, Calvados (U. C. L.)

Entre Dives et Villers, Calvados (U. C. L.)

Fécamp, Seine-Maritime (Mus. Gen.)

La Folletière, Calvados (Hann.)

Hennequeville, Calvados (Mus. Laus.)

La Malle, Var (Musé. coll. D'ORBIGNY)

Le Havre, Seine-Maritime (B. M., Ec. Min. orig. BAYLE, pl. 122,  
fig. 1, Mü., Mus. Laus., Musé. coll. D'ORBIGNY, Univ. Neuchâtel)

Le Mans, Sarthe (Mus. Laus.)

Nogent, Marne (Mus. Laus., N. M. W.)

Octeville, Calvados (U. C. L.)

Rouen, Seine-Maritime (B., KO., Mus. Gen., Musé. coll.  
D'ORBIGNY, N. M. W., U. C. L.)

Saint Jouin, Calvados (U. C. L.)

Saint Julien de Peyrolas, Gard (Mus. Gen.)

Saint Léonard, Fécamp, Seine-Maritime (Mus. Gen.)

Salazac, Gard (Ec. Min.)

Savigny, Ardennes (S. M.)

Seignelay, Yonne (Univ. Neuch.)

Terronne, Saint-Paul-Trois-Châteaux, Drôme (B.)

Vaches Noires, Calvados (B., B. M., Mus. Gen.)  
 Valbonne, Gard (Ec. Min., Mus. Gen.)  
 Villers, Calvados (Ec. Min., GH., U. C. L.)  
 Vimoutiers, Orne (Mus. Laus.)

## G. D. R. :

Boderitz, Dresden (DR.)  
 Leiteritz, Dresden (N. M. W.)  
 Neuleuteriz, Gossebaude (DR.)  
 Salzberg, Quedlinburg (B., DR.)

## G. F. R. :

Bad Abbach (Mü.)  
 Essen/Ruhr (B., DR., KO., N. M. W., R. E., R. M., S. M., U. B.  
 original GOLDFUSS, pl. 94, fig. 1)  
 Essen, Freiheit (R. E.)  
 Essen, Frohnhausen (B., R. E.)  
 Essen, Schacht Lohberg (R. E.)  
 Essen, Rüttenscheider Brücke (R. E.)  
 Essen, Wattenscheid - Sevinghausen (R. E.)  
 Essen, Ziegelei Deimelsberg (R. E.)  
 Essen, Mülheim - Heissen (R. E.)  
 Essen, Mülheim - Mellingshofen (R. E.)  
 Graslitz (N. M. W.)  
 Kelheim, Regensburg (Mü. orig. DACQUÉ, pl. 2, fig. 4)  
 Knertingen, Regensburg (B.)  
 Lappersdorf, Regensburg (B.)  
 Neukelheim (B., Mü. orig. DACQUÉ, sub *Pecten (Chlamys) saxo-*  
*nicus*, pl. 4, fig. 6)  
 Prüfening, Regensburg (Mü., orig. DACQUÉ, pl. 3, fig. 1)

## GREAT BRITAIN :

Beer Head, Devon (S. M.)  
 Blackdown, Devon (B., Mus. Gen.)  
 Chard, Somerset (S. M.)  
 Devizes, Wilts. (B. M., S. M.)  
 Donhead St. Andrews, Wilts. (B. M.)  
 Dunscombe, Devon (S. M.)  
 Eggerdon Hill, Dorset (S. M.)  
 Handfast Point, Dorset (B.)  
 Horningsham, Frome, Wilts. (B. M., SOWERBY Coll.)  
 Humble Point, Rowtson, Seaton, Devon (B. M.)  
 Maiden Bardley, Wilts. (S. M.)  
 Maiden Newton, Dorset (S. M.)  
 Rocken End, St. Catherine's Point, Isle of Wight (B. M.)  
 Shaftesbury, Dorset (B. M.)  
 Ventnor, Isle of Wight (B. M., S. M., Univ. Neuch.)

Warminster, Wilts. (B. M., Mus. Laus., S. M. also orig. Woods,  
 pl. 36, fig. 3 : B 46981, pl. 36, figs. 1 a-b : B 46979 - 46980)  
 White Cliff, Devon (B. M.)  
 Whitenoth, Dorset (B. M., S. M.)  
 Wilmington, Devon (B. M.)

## POLAND :

Burgberg near Niegoslawice (= Waltersdorf) (B.)  
 Łaszna (= Raspenau) (B.)  
 Lwówek Śląski (= Löwenberg) (B.)  
 Mieroszow (= Friedland) (B., KO., Musé coll. d'ORBIGNY, Mus.  
 Gen.)  
 Nieder-Schönau, near Mieroszow (B.)

## U. S. S. R. :

Ukraine :  
 Jaryszow (B. M.)  
 Radzivilow (B. M.)

## Turonian : BELGIUM :

*A. plenus*-zone :  
 Anderlues, Hainaut (I. R. Sc. N. B.)  
 Elouges, Puits 2 de Ferrand, Puits 4 de la Grande Veine, Hainaut  
 (I. R. Sc. N. B.)  
 Puits de Bernissart 4 et de la Grande Croix, Hainaut (I. R. Sc. N. B.)

## FRANCE :

Assevent, Nord (I. R. Sc. N. B.)  
 Boussières, Nord (I. R. Sc. N. B.)  
 Gussignies, Nord (I. R. Sc. N. B.)  
 Sassegny, Nord (I. R. Sc. N. B.)

## G. D. R. :

*A. plenus*-zone :  
 Gossebaude, Leiteritz, Elbstollen (DR.)

## G. F. R. :

Neuburg a. d. Donau (Mü.)

*Merklinia perornata* (J. COTTREAU, 1922)  
 (Pl. II, Fig. 2a, 2b)

- v. 1890 — *Chlamys Dujardini* A. PÉRON, pp. 235-236, pl.  
 27, f. 14.  
 non 1841 *Pecten dujardini* A. ROEMER (= *Lyropecten* (*Aequipec-*  
*ten*?) *ternatus* (MÜNSTER in GOLDFUSS, 1833)).

- ? 1916 — *Pecten (Aequipecten asperulinus)* F. FRECH, p. 277, pl. 15, f. 2a-b.
- non 1871 *Pecten (Chlamys) asperulinus* F. STOLICZKA (= *Lyropecten (Aequipecten?) ternatus* (MUNSTER in GOLDFUSS)).
- v . 1922 — *Pecten (Chlamys) Dujardini* Roem. mut. J. COTTREAU, p. 33, pl. 3, f. 7, 7a, 8.  
*perornata* nov.
- (1931) — *Pecten (Chlamys) Dujardini* Roem. mut. E. BASSE, p. 47.  
*praeornata* (laps. cal.)  
Cottreau
- v . 1933 — *Chlamys Dujardini* E. BASSE, p. 21, pl. 4, f. 7, 8.  
Roemer mut  
*praeornata* (laps. cal.)  
Cottreau

#### Location of type-specimens

Muséum national d'Histoire naturelle (the specimens both of PÉRON and of COTTREAU), Paris.

#### Stratum typicum :

- C. dujardini* PÉRON non ROEMER : « Danien » (Maastrichtian).  
« *P. » perornata* COTTREAU : Maastrichtian.

#### Locus typicus :

- C. dujardini* PÉRON non ROEMER : Bir Magueur (Tunisia).  
« *P. » perornata* COTTREAU : Lokia (Malagasy Republic).

#### Original description

See in PÉRON, 1890 and COTTREAU, 1922.

#### Additional description

Numbers of specimens studied : 24.

|                            |    |
|----------------------------|----|
| Algerian Campanian ... ..  | 2  |
| Iraqi Maastrichtian ... .. | 15 |
| Malagasy ... ..            | 5  |
| Tunisian ... ..            | 2  |

## Measurements :

## Malagasy Maastrichtian :

| U. P. D. | W.      | A. A. | Ribs | S.  | Locality |
|----------|---------|-------|------|-----|----------|
| —        | —       | —     | —    | —   | —        |
| 38.0 mm  | 35.7 mm | —     | 11   | R   | Lokia    |
| 38.3 mm  | 35.4 mm | 82°   | 10   | L   | Lokia    |
| 40.3 mm  | 39.7 mm | —     | 11   | R   | Lokia    |
| —        | 39.6 mm | —     | 10   | L   | Lokia    |
| 47.2 mm  | 49.3 mm | 93°   | 10   | L ? | Lokia    |
| 40.6 mm  | 36.7 mm | 91°   | 11   | R ? | Ambondra |
| 39.9 mm  | 37.7 mm | 91°   | 11   | L ? | Ambondra |
| —        | 40.7 mm | —     | 10   | R ? | Ambondra |
| —        | 40.9 mm | —     | 11   | L ? | Ambondra |

## Description :

**Diagnosis.** — Medium-sized *Merklinia*-species with 10-12 radial, subdivided ribs, usually covered with small scales; lunulate areas present.

Both valves are rather convex, equilateral and covered with 10 to 12 radial ribs, which are rounded and not very elevated. The shallow intercostal intervals are as broad as or a little narrower than the ribs themselves; both ribs and intervals are covered with a large number of riblets : on the ribs five or more, whereas in the intervals there are three or more. The valves are concentrically striated and these striae are the origin of the scales on all riblets; on the top of the principal ribs the scales can be large and elongated, almost spine-like. The ribs of left and right valves interlock : thus the intervals of one valve are the counterpart of the ribs of the other valve. The auricles are relatively small; all of them are almost right-angled; the anterior auricle of the right valve has a shallow byssal sinus; all auricles are covered with radial riblets bearing small scales.

The lunulate areas bear striae and have the general shape described for *M. aspera*.

## Discussion

## Variability :

I have seen only a limited number of specimens of this species. They are slightly variable in ribnumber : 10 to 12 principal ribs; on a sample from Iraq (15 specimens), the distribution is the following : 6 specimens with 10 ribs, 8 specimens with 11 ribs, 1 which could not be counted.

As for the side-riblets, the variability is broader and probably depends on the size of the specimens; I have only been able to count it on a sample with specimens of approximately the same size and then the number of riblets on the principal ribs varies from 5 to 9 and in the intercostal



intervals from 3 to 7. The difference from other *Merklinia* species is that in *M. perornata* the increase of side-riblets seems to occur at the same moment in all the principal ribs.

#### Synonymy and differentiation :

*Lyropecten* (*Aequipecten* ?) *ternatus* (G. VON MUENSTER in A. GOLDFUSS, 1833) (see in DHONDT, A. V. 1972b, p. 42, pl. 2, fig. 3a, b, pl. 3, fig. 1a-d) and *Merklinia perornata* (J. COTTREAU) belong to different genera, but nevertheless it is necessary to discuss them together, because single valves of both species could be confused : both species have almost the same rib number, and on top of the ribs are scales and spine structures; some *L. (A ?) ternatus* specimens have an orbicular shape as have all *M. perornata* specimens; the auricles of *M. perornata* are relatively smaller than those of *L. (A ?) ternatus*, but except for the anterior right valve auricle, which is elongated in the latter species, both species have similarly shaped auricles.

The differences between both species are :

- in *M. perornata* ribs are equal on left and right valves, in *L. (A ?) ternatus* they are different;
- in *M. perornata* spines and spinules are never present and only scales occur; in *L. (A ?) ternatus* one of the valves always bears spines;
- in *M. perornata* all ribs and riblets are covered with scales, in *L. (A ?) ternatus* some riblets are smooth, and even on some valves all parts of the ribs are smooth except the top of the principal ribs;
- in *M. perornata* there is no difference between the riblet on top of the principal rib and the first side-riblet next to it; in *L. (A ?) ternatus* these two riblets are different in width and elevation;
- in *M. perornata* lunulate areas are always present; in *L. (A ?) ternatus* I have never seen them;
- in *M. perornata* both valves are orbicular and convex; in *L. (A ?) ternatus* they are usually elongated and flattened;
- in *M. perornata* the anterior auricle of the right valve has a shallow byssal sinus and otherwise has almost the shape of an equilateral triangle; in *L. (A ?) ternatus* the same auricle has a deep byssal sinus, is elongated and winglike, and hence its hinge-margin is much longer than its apical margin.

In well preserved double valved specimens no confusion is possible between both species, but when one possesses only one valve the confusion is understandable. This could explain why A. PERON considered his specimens as belonging to *Pecten dujardini* ROEMER (= *L. (A ?) ternatus* (MUENSTER in GOLDFUSS)). J. COTTREAU thought that *Pecten asperulinus* STOLICZKA, 1871 belonged to *Merklinia perornata*, but I consider it to be a *L. (A ?) ternatus* because its auricles and ribornamentation are as on this last species.

*Merklinia perornata* can be differentiated from the other *Merklinia* species on the following characteristics :

- it has fewer and broader ribs than *M. aspera*;
- it has more rounded ribs without spines, unlike *M. variabilis*.

#### Palaeogeography :

*M. variabilis* and *M. perornata* are known from geographically distinct regions : the former from the North European Cretaceous (boreal), the latter from North and South East African and Middle Eastern Cretaceous (Tethyan); both species have a number of common characteristics, which makes it likely that they have a common ancestor close to *M. aspera* or even that species itself, but that from there they were dispersed in different regions and evolved slightly differently.

#### Generic attribution :

*Pecten* (*Chlamys*) *perornata* (J. COTTREAU, 1922) is very close to *Pecten asper* LAMARCK, 1818 which is the type-species of *Merklinia* V. A. SOBETZKI, 1960. Hence its correct name becomes *Merklinia perornata* (COTTREAU, 1922).

#### Stratigraphical and geographical distribution :

Senonian s. l. : MALAGASY REPUBLIC :

Ambondra (Musé. orig. E. BASSE, 1932, pl. 4, fig. 7, 8)

Lokia (Musé. orig. J. COTTREAU, 1922, pl. 3, fig. 7, 7a, 8)

Campanian : ALGERIA :

El Kantara (B. M.)

Maastrichtian : IRAQ :

Abu Gahr (B. M.)

TUNISIA :

Bir Magueur (Musé. orig. A. PERON, 1890, pl. 27, fig. 14)

#### *Merklinia variabilis* (F. VON HAGENOW, 1842)

(Pl. I, Fig. 2; Pl. II, Fig. 1a, 1b)

- |                                        |                         |
|----------------------------------------|-------------------------|
| . 1842 — <i>Pecten variabilis</i> nob. | F. VON HAGENOW, p. 552. |
| . 1842 — <i>Pecten trisulcus</i> nob.  | F. VON HAGENOW, p. 552. |
| . 1842 — <i>Pecten Leonhardi</i> nob.  | F. VON HAGENOW, p. 551. |
| (1849) — <i>Pecten Leonhardi</i> Hag.  | H. G. BRONN, p. 926.    |
| (1849) — <i>Pecten trisulcus</i> Hag.  | H. G. BRONN, p. 933.    |
| (1849) — <i>Pecten variabilis</i> Hag. | H. G. BRONN, p. 934.    |
| v . 1850 — <i>Pecten excisus</i>       | A. ALTH, p. 246.        |

- ? 1850 — *Pecten excisus* R. KNER, p. 29.  
 non 1837 *Pecten excisus* G. PUSCH, p. 41, pl. 5, f. 6.  
 (= 1833 *Pecten trigeminatus* A. GOLDFUSS).  
 (1852) — *Pecten trisulcus* Hag. C. PUGGAARD, p. 16.  
 . 1859 — *Pecten tricostatus* Müller J. MUELLER, p. 8, pl. 7,  
 f. 31.
- non 1849 *Pecten tricostatus* BAYLE.  
 (= 1847 *Neithea alpina* (D'ORBIGNY)).  
 (1859) — *Pecten tricostatus* Müll. J. T. BINKHORST VAN DEN  
 BINKHORST, p. 134, 154.  
 (1860) — *Pecten tricostatus* Müll. J. BOSQUET, n° 487.  
 v . 1869 — *Pecten subexcisus* E. FAVRE, p. 151, pl. 13,  
 E. Favre f. 8.  
 (1871) — *Pecten trisulcus* Hagenow F. STOLICZKA, p. 429.  
 (1871) — *Pecten tricostatus* Müller F. STOLICZKA, p. 429.  
 (1871) — *Pecten Leonhardi* F. STOLICZKA, p. 429.  
 Hagenow  
 (1871) — *Pecten variabilis* F. STOLICZKA, p. 429.  
 Hagenow  
 . 1889 — *Pecten tricostatus* Müll. E. HOLZAPFEL, p. 236, pl. 26,  
 f. 17.
- v . 1889 — *Pecten trigeminatus* O. GRIEPENKERL, p. 42.  
 ? 1889 — *Pecten trigeminatus* O. GRIEPENKERL, p. 42.  
 var. *armata*
- non 1833 *Pecten trigeminatus* GOLDFUSS.  
 (1895) — *Pecten tricostatus* F. VOGEL, p. 25.  
 J. Müller
- v . 1897 — *Chlamys ternata* H. WOODS, p. 382.
- non 1833 *Pecten ternatus* MUENSTER in GOLDFUSS.  
 v . 1902 — *Pecten (Aequipecten)* H. WOODS, p. 190, pl. 36,  
*pexatus* sp. nov. f. 5-7.  
 v . 1902 — *Pecten variabilis* J. P. J. RAVN, p. 90, pl. 1,  
 v. Hagenow f. 17.  
 (1903) a — *Pecten pexatus* Woods A. W. ROWE, p. 50.  
 (1908) — *Pecten pexatus* Woods A. W. ROWE, p. 339.  
 . 1909 — *Pecten (Chlamys) trisulcus* W. ROGALA, p. 694.  
 Hag.
- (1911) — *Pecten trisulcus* Hag. W. ROGALA, p. 493.  
 (1918) — *Pecten (Aequipecten)* G. E. DIBLEY, p. 93.  
*pexatus* Woods
- v . 1918 — *Pecten (Chlamys)* J. P. J. RAVN, p. 26, pl. 2,  
*pexatus* Woods f. 5.  
 ? 1921 — *Pecten (Chlamys)* J. P. J. RAVN, p. 21.  
*trisulcus* v. Hag. ?
- (1921) — *Pecten (Chlamys)* J. P. J. RAVN, p. 21.  
*pexatus* Woods

- . 1923 — *Pecten (Chlamys)*  
*variabilis* v. Hag. A. JESSEN & H. ØDUM, p.  
36-37, pl. 2, f. 1a-c.
- (1924) — *Pecten pexatus* Woods H. D. HEWITT, p. 241.
- (1924) — *Pecten pexatus* Woods C. T. A. GASTER, p. 110.
- (1926) — *Pecten (Chlamys)*  
*variabilis* Hag. H. ØDUM, p. 180.
- . 1932 — *Pecten (Chlamys)*  
cf. *trigeminatus* Goldf. D. WOLANSKY, p. 15.
- . 1932 — *Pecten trigeminatus* var.  
*armata* Griepenkerl D. WOLANSKY, p. 16.
- non 1833 *Pecten trigeminatus* GOLDFUSS.
- ? 1934 — *Pecten (Aequipecten)*  
*pexatus* Woods H. ANDERT, p. 162.
- (1938) — *Pecten trisulcus* v. Hag. W. POZARYSKI, p. 22.
- (1942) — *Aequipecten pexatus*  
Woods C. W. & E. V. WRIGHT, p.  
117.
- (1942) — *Aequipecten trisulcus* H. PUTZER, p. 371.
- ? 1943 ? — *Pecten tricostatus* W. J. M. VAN DER WEIJDEN,  
p. 86.
- . 1946 — *Pecten (Chlamys)*  
*variabilis* v. Hag. J. P. J. RAVN, pp. 23-24.
- 1946 — *Pecten (Chlamys)*  
*pexatus* Woods J. P. J. RAVN, p. 23.
- (1965) b — *Pecten (Chlamys)*  
*trisulcatus* (sic) Hag. S. CIESLINSKI, p. 120.
- . 1968 — *Chlamys (Chlamys)*  
*trisulca* (Hagenow) S. I. PASTERNAK *et al.*, pp.  
157-158, pl. 33, f. 3, 4.
- . 1968 — *Chlamys (Chlamys)*  
*trisulca armata*  
(Griepenkerl) S. I. PASTERNAK *et al.*, p. 158,  
pl. 33, f. 5.

#### Location of type-specimens

*Pecten variabilis*, *P. trisulcus*, *P. leonhardi* : lost; the VON HAGENOW collection was in Szczecin (Poland); the museum there was destroyed during the Second World War and the type-specimens were lost.

*Pecten excisus* ALTH = *Pecten subexcisus* FAVRE (monotypy) : Naturhistorisches Museum, Vienna (Austria) : n° 1862 V 279.

*Pecten tricostatus* MUELLER : Technische Hochschule, Aachen (G. F. R.).

*Pecten pexatus* : Sedgwick Museum, Cambridge (G. B.).

#### Stratum typicum :

*Pecten variabilis*, *P. trisulcus*, *P. leonhardi* : Weisse Kreide (Lower Maas-trichtian).

- P. excisus* ALTH : Kreidemergel (Upper Maastrichtian).  
*P. tricostatus* MUELLER : Hornstein (Upper Senonian).  
*P. pexatus* : *H. planus* zone (Upper Turonian).

Locus typicus :

- P. variabilis*, *P. trisulcus*, *P. leonhardi* : Rügen (G. D. R.).  
*P. excisus* ALTH : Lemberg (Lwow, Ukraine, U. S. S. R.).  
*P. tricostatus* MUELLER : Aachener Wald (near Aachen, G. F. R.).  
*P. pexatus* : Cheveley (Cambs., G. B.).

Original descriptions

*Pecten variabilis*

« Lang Ei-rund, stark gewölbt und sehr schief, wodurch sich diese Art sogleich von der vorigen (3) unterscheidet, mit welcher sie jedoch hinsichtlich der dreitheiligen Rippen grosse Aehnlichkeit hat; diese sind eben so, aber mit etwas mehr röhrigeren Stacheln besetzt und mit feinen Zähnen gesäumt, welche beide jedoch bei einem grösseren Exemplare, 2 Linien vom Rande entfernt, plötzlich aufhören. Die Rippen setzen über diesem glatten Saum fort und gleichen sich die Haupt- und Neben-Rippen zu fast gleicher Stärke aus, und zwar so, dass jede derselben wieder dreitheilig wird und aus einer höher gelegenen, glatten abgerundeten Leiste mit zwei etwas tiefer zu beiden Seiten liegenden, halbrunden Stäben besteht, welche letzte mit zarten, gebogenen Queer-Rippen bedeckt sind.

Läng eines jungen, wohl erhaltenen Exemplare : 6'', Breite 4''. »

*Pecten Leonhardi*

« Lang-oval, etwas chief, mässig. Im Innern treten 12 abgerundete, breite, durch scharfe Furchen begrenzte glatte Längs-Rippen vor, deren jede durch 2 feine Längs-Linien dreitheilig zerspalten ist. Das vordere Ohr fast gerade aufgehend und spitzwinkelig, das hintere lang Flügel-förmig abgerundet und längsgefurcht, wie das Innere der Schale. Die Schlosslinie gerade, scharf ungebogen; der Schlosskanten-Winkel etwa 85°. Die Aussen-Fläche mit 13 scharfen, weitläufig mit kurzen Stacheln besetzten Rippen, die mit den inneren Haupt-Furchen korrespondiren. Ebenfalls mit den innern schwachen Doppel-Linien korrespondirend treten zwischen den Haupt-Rippen niedrige scharfe Neben-Rippen paarig hervor, welche gedrängter mit feinen Zacken besetzt sind, als die Haupt-Rippen. Die zwischenliegenden glatten Furchen sind schmaler als die Rippen, welche alle an der Basis zu beiden Seiten mit nach vorwärts gerichteten feinen Zähnen enge gesäumt sind. Die Ohren sind längsgerippt und tragen lange scharfe Dornen. Nur in einer linken Schale vorhanden.

Länge 5''6'', Breite 4''5''. »

*Pecten trisulcus*

« Halbkreis-förmig, etwas schief und stark gewölbt; die vordere Schlosskante länger und mehr Bogen-förmig eingebuchtet als die hintere; sie bilden einen spitzigen Winkel. Vorderes Ohr gerade aufsteigend, das hintere lang und zugespitzt Flügel-förmig; 11 schmale, abgerundete, glatte Rippen zertheilen sich in der Nähe des Wirbels, jede zu dreien, später aber nicht mehr, so dass in Allem 33 vorhanden sind; sie strahlen nur in der Mitte der Schale gerader, nach den Seiten aber Bogen-förmig aus. Jede ist von zwei abgerundeten, Stab-förmigen, etwas niedriger liegenden Neben-Rippen begrenzt, welche von gebogenen, feinen Queer-Rippen weitläufig durchkreuzt werden. Zwischen den benachbarten Neben-Rippen bleibt als Zwischenraum nur eine schmale, scharfe Kerbe. Im Unrisse am ähnlichsten der Abbildung bei Goldfuss 95,7.

Länge und Breite 1''1''. »

(3) *Pecten leonhardi*.

*Pecten excisus* ALTH non PUSCH

« Testa ovata, convexa, costulis 30 plano-convexis, subflexuosis, sulcis glabris profundis, rostro acutangulo, auriculis aequalibus, utroque latere sinuatis et in margine profunde excisis.

Das einzige Exemplar, das bis jetzt als Steinkern bei Lemberg gefunden wurde, stimmt in der eigenthümlichen Beschaffenheit der Ohren mit der Pusch'schen Species überein, zeigt jedoch manche Unterschiede von der Pusch'schen Abbildung. Es ist nämlich schlanker, 16 Mill. lang, 21 breit und etwas schief, die eine Schlosskante 8, die andern etwas eingebogene 14 Mill. lang, 36 einfache Radialrippen bedecken die Oberfläche, sie sind ungleich, und zwar folgt auf zwei schwächere immer eine stärkere, nur zunächst der längern Schlosskante befinden sich einige gleiche etwas entfernter stehende Rippen. Diese Rippen des Steinkernes sind abgerundet, die Zwischenräume eben. Nur das eine Ohr ist gut erhalten, dieses zeigt zunächst eine tiefe Einbiegung nach innen, gegen die andere Schale, welcher Einbiegung, wenn die Schalen schliessen sollten, an der andere Schale eine eben so starke Ausbauchung des Ohres entsprechen müsste. Diese Einbiegung nimmt die halbe Höhe des Ohres ein, die andere Hälfte des Ohres ist flach, aber gegen die Ebene der Muschel etwas geneigt, und scharf radial gefaltet und concentrisch gestreift, während der gebogene Theil des Ohres nur concentrische Streifen zeigt, der ebene Theil ist am Rande convex abgerundet, der gebogene hingegen stark ausgeschnitten. »

## Additional description

Number of specimens studied: 283.

|                                    |    |
|------------------------------------|----|
| British Turonian ... ..            | 10 |
| Danish Turonian ... ..             | 1  |
| Belgian Dutch Senonian ... ..      | 4  |
| British Senonian ... ..            | 16 |
| Czech Senonian ... ..              | 3  |
| Danish Senonian ... ..             | 6  |
| East German Senonian ... ..        | 2  |
| West German Senonian ... ..        | 13 |
| Belgian Dutch Maastrichtian ... .. | 23 |
| British Maastrichtian ... ..       | 15 |
| Danish Maastrichtian ... ..        | 90 |
| East German Maastrichtian ... ..   | 85 |
| Ukrainian Maastrichtian ... ..     | 7  |
| West German Maastrichtian ... ..   | 8  |

## Measurements :

| Locality                  | U. P. D. | W.      | A. A. | Side | Museum |
|---------------------------|----------|---------|-------|------|--------|
| —                         | —        | —       | —     | —    | —      |
| Rügen (G. D. R.)          | 21.2 mm  | —       | 97°   | L    | GR.    |
| Rügen (G. D. R.)          | 12.5 mm  | 11.7 mm | —     | R    | GR.    |
| Brezno, Louny<br>(Czech.) | 22.7 mm  | 21.0 mm | —     | —    | DR.    |
| Haldem (G. F. R.)         | 28.2 mm  | 22.5 mm | —     | —    | DR.    |
| Haldem (G. F. R.)         | 28.1 mm  | 24.8 mm | 95°   | L    | B.     |
| Haldem (G. F. R.)         | —        | 18.4 mm | 102°  | L    | B.     |
| Haldem (G. F. R.)         | —        | —       | 89°   | R    | B.     |

| Locality                                   | U. P. D. | W.      | A. A. | Side | Museum          |
|--------------------------------------------|----------|---------|-------|------|-----------------|
| Haldem (G. F. R.)                          | 18.7 mm  | 16.9 mm | —     | L    | B.              |
| Haldem (G. F. R.)                          | 23.2 mm  | 19.3 mm | 94°   | L    | B.              |
| Haldem (G. F. R.)                          | 31.2 mm  | 24.5 mm | 84°   | R    | B.              |
| Lauingen (G. F. R.)                        | 21.2 mm  | 19.4 mm | 88°   | R    | B.              |
| Lauingen (G. F. R.)                        | 25.7 mm  | —       | —     | L    | B.              |
| Hemmoor (G. F. R.)                         | 14.0 mm  | 11.5 mm | —     | —    | G. H.           |
| Hemmoor (G. F. R.)                         | 20.0 mm  | —       | —     | R    | G. H.           |
| Hemmoor (G. F. R.)                         | 10.0 mm  | —       | —     | L    | G. H.           |
| Gross Bülden<br>(G. F. R.)                 | 19.5 mm  | 17.0 mm | 80°   | —    | G. H.           |
| Gross Bülden<br>(G. F. R.)                 | 24.0 mm  | 22.0 mm | 88°   | L    | G. H.           |
| Gross Bülden<br>(G. F. R.)                 | 16.0 mm  | 15.0 mm | 83°   | L    | G. H.           |
| Gross Bülden<br>(G. F. R.)                 | 15.5 mm  | —       | —     | —    | G. H.           |
| Lwow (U. S. S. R.)                         | 35.1 mm  | 31.6 mm | —     | R    | B.              |
| Hautes Fagnes<br>(Belgium)                 | 22.1 mm  | 21.2 mm | 75°   | —    | I. R. Sc. N. B. |
| Beutenaken (Neth.)                         | 18.8 mm  | 16.8 mm | 81°   | —    | I. R. Sc. N. B. |
| Maastricht (Neth.)                         | 7.4 mm   | 5.9 mm  | 73°   |      | I. R. Sc. N. B. |
|                                            | to       | to      | to    |      | I. R. Sc. N. B. |
|                                            | 12.3 mm  | 11.4 mm | 88°   |      |                 |
| East Harnham<br>(G. B.)                    | —        | 19.9 mm | —     | ?    | B. M.           |
| East Harnham<br>(G. B.)                    | —        | 10.7 mm | —     | ?    | B. M.           |
| New Catton,<br>Norwich (G. B.)             | —        | 6.2 mm  | 72°   | R    | B. M.           |
| The Hooken, Beer<br>Head, Devon<br>(G. B.) | —        | 24.6 mm | —     | ?    | B. M.           |
| Haldon Hills (G. B.)                       | 21.2 mm  | 20.3 mm | —     | L    | B. M.           |
| Haldon Hills (G. B.)                       | 15.8 mm  | 13.3 mm | 75°   | R    | B. M.           |

### Description :

**Diagnosis.** — Small to medium-sized *Merklinia*-species; both valves are usually covered with 11 subdivided ribs; principal and side-riblets bear well developed spines.

The valves are acline to slightly prosocline with relatively large unequal auricles and a macrosulpture which is almost identical on both valves; they are covered with 11 slightly diverging ribs which are subdivided into 3 to 7 almost equal riblets; the intercostal intervals are very narrow. The

ribs, on well preserved specimens, bear spines : long spines on top of the principal ribs and smaller spines on the 2 to 6 side-riblets (1 to 3 side-riblets on each side of each principal rib). On steinkern preservation the top-riblet and the side-riblets are smooth.

Right valve : anterior auricle : with deep byssal sinus and 3 to 5 radial riblets parallel to the hinge margin; posterior auricle : smaller, almost right-angled, triangular; the ornamentation is not well developed.

Left valve : anterior auricle : large and with radial riblets; posterior auricle : as on the right valve.

### Discussion

#### Synonymy :

F. VON HAGENOW, 1842 described three taxa : *Pecten leonhardi*, *P. variabilis* and *P. trisulcus*. J. P. J. RAVN, 1902 proved the first two to be synonymous. *P. trisulcus* is also synonymous with *P. variabilis* : in VON HAGENOW's description it is larger than *P. variabilis* and it is a steinkern, but it has the same prosocline shape, the same auricle shape and the same number of slightly diverging ribs. It does not have a spine ornamentation, but this is due to the state of preservation. Specimens from Rügen kept in the Ernst-Moritz-Arndt University in Greifswald, which reach the size of, or are larger than, the type of *P. trisulcus* have spines, which are supposed to be found only on small specimens then named *P. variabilis*.

According to the Rules of Zoological Nomenclature *P. variabilis* has priority over *P. trisulcus* (Art. 24 and Recommend. 24 A).

*P. tricostatus* J. MUELLER, 1859 as figured and described by MUELLER and E. HOLZAPFEL is undoubtedly identical with *Merklina variabilis*.

The specimen from Lwow described by A. ALTH, 1850 as *Pecten excisus* (*P. subexcisus* in FAVRE, because ALTH's name was pre-employed) is kept in the Naturhistorisches Museum in Vienna. It is a well preserved steinkern of *Merklina variabilis*. *Pecten* (*Aequipecten*) *pexatus* H. WOODS, 1902 does not have differentiating characteristics from *M. variabilis* (VON HAGENOW) : the macrosculpture and the measurements are identical. The auricles are formed in the same way. According to VON HAGENOW specimens from Rügen are « schief » (= oblique, prosocline) : some specimens from Maastricht are slightly prosocline, others not; most right valves seem to be more prosocline than they are in reality, because their anterior auricle is elongated and thus the hinge line is much longer at the anterior than at the posterior side. Many specimens of *P. pexatus* WOODS have very incomplete auricles or none at all, and thus the impression of prosocline on those specimens is far less. That H. WOODS never thought of relating his *P. pexatus* with the taxa described by VON HAGENOW from Rügen is not really surprising : in 1902 there were no figures of those taxa available from Rügen, and those specimens of *P. variabilis* which



had been figured were steinkernen without trace of the typical ornamentation (in FAVRE, E. 1869, HOLZAPFEL, E. 1889, MUELLER, J. 1859).

#### Variability :

*Merklinia variabilis*, despite its name, is not very variable : the rib-number varies from 9 to 12, but is almost always 11; the ribs are subdivided and on each side of the principal ribs there are 1 to 3 side-riblets.

It is likely that the small specimen from East Harnham (Wilts.) described by H. WOODS (1902, p. 191, pl. 36, fig. 8) as *Pecten (Aequipecten) spec.* is also a *Merklinia variabilis* for the following reasons :

1. the specimens described by WOODS are very small (U. P. D. max. 10 mm) : the number of side-riblets increases when the size of the valves increases; thus the smallest specimens from Maastricht have only one side-riblet on each side of the ribs. I have never seen *M. variabilis* specimens with undivided ribs. However, very small specimens of *M. aspera* (LAMARCK) are known from Vaches Noires and Hennequeville (Normandy, specimens in Mus. Gen. and Mus. Laus.) : they have very long spines on their ribs, as in *Pecten (Aequipecten) spec.*, but next to that one only poorly developed side-riblet. These valves of *M. aspera* are slightly larger than those described by WOODS. Thus it could be that *P. (Aequipecten) spec.* is a very young specimen of *Merklinia variabilis*; unfortunately no specimen which really makes the transition is known.
2. *Pecten (Aequipecten) spec.* has only been described from localities from which *M. variabilis* (sub *P. pexatus*) is known : namely Burham (Kent) and East Harnham (Wilts.).

#### Differentiation :

*M. variabilis* is differentiated from the other *Merklinia* species by the longer spines on the principal ribs and because U. P. D. > W., whereas the other species have a more orbicular shape. *M. aspera* (LAMARCK) has more ribs, and *M. perornata* (COTTREAU) has relatively smaller auricles.

#### Palaeogeographical note :

This species seems to be limited to the Northern European White Chalk (« Schreibkreide »). It is found in Turonian to Lower Maastrichtian strata in Great Britain, Campanian to Upper Maastrichtian in Limburg (Belgium - The Netherlands) (not however, in Hainaut, Paris Basin), Senonian to Maastrichtian in North Germany, Turonian to Maastrichtian in Denmark, Senonian in Saxony and Czechoslovakia (very rare in these areas, but the number of specimens could be small because of the limited occurrence of marine Senonian deposits), Campanian to Maastrichtian in Poland and Maastrichtian of Western Ukraine (U. S. S. R.).

## Generic attribution :

*Pecten variabilis* VON HAGENOW, 1842 is so similar in ornamentation and general shape to *Pecten asper* LAMARCK, type-species of *Merklinia* SOBETZKI, that its correct name becomes *Merklinia variabilis* (VON HAGENOW, 1842).

## Stratigraphical and geographical distribution :

## Turonian : DENMARK :

Bornholm : Arnager (KO. orig. RAVN, 1918, pl. 2, fig. 5)

## GREAT BRITAIN :

*T. lata*-zone :

Charing, Kent (B. M.)

The Hooken, Beer Head, Devon (B. M.)

*H. planus*-zone :

Blue Bell Hill, Burham, Kent (B. M.)

Cheveley, Cambs. (S. M. also orig. WOODS, pl. 36, fig. 6)

Hackhurst Pit, Gomshall, Surrey (B. M.)

## Senonian : BELGIUM - THE NETHERLANDS :

Campanian : Beutenaken, Limburg (I. R. Sc. N. B.)

? Campanian : Hautes Fagnes, Liège (I. R. Sc. N. B.)

## CZECHOSLOVAKIA :

Brezno, Louny (DR.)

## DENMARK :

Bornholm : Blykobbe Aa (KO.)

## G. D. R. :

Halberstadt (GR.)

## G. F. R. :

Aachen (B. coll. VON SCHLOTHEIM)

Gross Bülden (GH.)

Haldem (B., B. M., DR.)

Lauingen, Königslutter (B.)

## GREAT BRITAIN :

*M. coranguinum*-zone :

E. of Basingstoke Junction, Hants. (S. M.)

*A. quadratus*-zone :

Boxley, Maidstone, Kent (B. M.)

East Harnham, Salisbury, Wilts. (B. M. also orig. WOODS, pl. 36, fig. 5 L 64206, pl. 36, fig. 7 L 64207)

*B. mucronata*-zone :

Attoe's Pit, New Catton, Norwich (B. M.)

Clarendon, Salisbury, Wilts. (B. M.)

« Senonian derived in Eocene gravels » :

Haldon Hills, Devon (B. M.)

Upper Chalk :

Hursley, Hants. (S. M.)

Lewes, Sussex (S. M.)

## Maastrichtian : BELGIUM - THE NETHERLANDS :

Maastricht (B., I. R. Sc. N. B.)

## DENMARK :

Aalborg (KO.)

Allindelille (KO.)

Bjerre Thy (KO.)

« Dania », Mariagerfjord (KO.)

Gudumsholm (KO.)

Hillerslev Thy (KO.)

Kastrup (KO.)

Klitgaard (KO.)

Kjølby Gaard (KO.)

Kongerslev (KO.)

Moens Klint (KO.)

« Norden », Aalborg (KO.)

Nørholm (KO.)

Nørre Flødal (KO.)

Nørre Uttrup (KO.)

Rørdal (KO.)

Skovbakken (KO.)

Smidie (KO.)

Stevns Klint (KO.)

## G. D. R. :

Rügen (GR.)

## G. F. R. :

Hemmoor (GH., Hann.)

## GREAT BRITAIN :

Trimingham, Norfolk (Geol. Sci.)

## U. S. S. R. :

Lwow (B., N. M. W.)

Nagorzany (DR., Ec. Min.)

## REFERENCES

## Opinion 311.

1954. Validation, under the Plenary Powers, of the specific name *asper* LAMARCK, 1819, as published in the combination *Pecten asper* (Class Pelecypoda). Opinions and Declarations rendered by the International Commission on Zoological Nomenclature. — *Bull. Zool. Nomenclature* 8 : 367-374.
- ALTH, A.  
1850. Geognostisch-paläontologische Beschreibung der Umgebung von Lemberg. — *Haidinger's naturw. Abb.* 3 : 171-284, pls. 10-13, map.
- ANDERT, H.  
1934. Die Kreideablagerungen zwischen Elbe und Jeschken. III Die Fauna der obersten Kreide in Sachsen, Böhmen und Schlesien. — *Abh. preuss. geol. Landesanst.* N. F. 159 : 5-477, pls. 1-19, textfigs. 1-93.
- ARCHIAC, A. D'  
1837. Mémoire sur la formation crétacée du sud-ouest de la France. — *Mém. Soc. géol. Fr.* (1), 2 : 157-192.  
1839. Observations sur le Groupe moyen de la Formation Crétacée. — *Mém. Soc. géol. Fr.* (1), 3 : 261-311.
- ARNOLD, H.  
1964. Fossiliste für die Münsterländer Oberkreide. — *Fortschr. Geol. Rheinld Westf.* 7 : 309-330, 1 textfig.
- BASSE, E.  
1931-1932. Monographie paléontologique du Crétacé de la province de Maintirano (Madagascar). — *Serv. Mines Madagascar*, 5-86, pls. 1-13.  
1933. Faune malacologique du Crétacé supérieur du sud-ouest de Madagascar. — *Ann. Paléont.* 21 : 1-80, pls. 1-9.
- BAYLE, E. in FOURNEL.  
1849. Sur quelques fossiles de la Province de Constantine. — pp. 359-379, pls. 32, 33.
- BAYLE, E.  
1878. Explication de la carte géologique de la France. — V. 4, part I. *Fossiles principaux des terrains de la France II*, pls. 80-158.
- BOENOIT, A.  
1931. Excursion géologique et botanique du 26 juillet, à Séry, Justine, Herbigny. — *Bull. Soc. Hist. nat. Ardennes* 26 : 75-85.
- BINKHORST VAN DEN BINKHORST, J. T.  
1859. Esquisse géologique et paléontologique des couches crétacées du Limbourg, et plus spécialement de la craie tuffeau. — Maastricht, pp. I-XVIII, 1-268, pls. 1-5, 1 map.
- BOSQUET, J.  
1860. « Fossile Fauna en Flora van het krijt in Limburg » in W. C. H. STARING's *Natuurlijke Historie van Nederland. De Bodem van Nederland*, v. 2 : Bivalvia : 376-388.
- BRONGNIART, A. in CUVIER, G.  
1822. « Description géologique des couches des environs de Paris » in *Les Ossemens fossiles*. — V. II, 2 : 229-648, pls. 1-3.
- BRONN, H. G.  
1849. *Handbuch einer Geschichte der Natur : Index Paleontologicus*. — I : A-M : 1-775, II : N-Z : 776-1382. Stuttgart.
- CAYEUX, L.  
1957. La zone remaniée de l'Albien au cap de la Hève. — *Bull. Soc. géo. Normandie* 47 : 12-13.  
1958. Le niveau inférieur du Cénomaniens de Saint-Jouin et ses fossiles géants. — *Bull. Soc. géol. Normandie* 48 : 11-12.
- CELET, P.  
1966. Remarques du l'Albien et le Cénomaniens du sous-sol de Rozoy-sur-Serre (Aisne). — *Ann. Soc. géol. Nord* 86, 4 : 221-224, 1 textfig.

CIEŚLIŃSKI, S.

1965. Results of macropalaeontological investigations of bore-hole Ostrowa Mazowiecka IG 1. — *Bull. Inst. géol. Warsz.* 186 : 119-123.

COQUAND, H.

1857. Notice sur la formation crétacée du département de la Charente. — *Bull. Soc. géol. Fr.* (2), 14 : 55-98, textfigs. 1-11.

CORNET, F. L. & BRIART, A.

1875. Sur le synchronisme du système hervien de la province de Liège et de la craie blanche moyenne du Hainaut. — *Ann. Soc. géol. Belg.* 2 : 108-122.

CORNET, J.

1901. Note sur les assises comprises, dans le Hainaut, entre la Meule de Bracquenies et le Tourtia de Mons. — *Ann. Soc. géol. Belg.* 28 : B52-B59.

COTTEAU, G.

- 1853-1857. Etudes sur les Mollusques fossiles du département de l'Yonne. — Paris, pp. 1-141.

COTTREAU, J.

1922. Paléontologie de Madagascar. X. Fossiles de la Côte orientale. — *Ann. Paléont.* 11 : 3-80, pls. 1-11.

COX, L. R.

1940. Cretaceous Mollusca described by R. PULTENEY in the second edition of Hutchin's History of Dorset. — *Proc. malacol. Soc. Lond.* 24, 3 : 121-128, pl. 7.

DACQUÉ, E.

1939. Die Fauna der Regensburg-Kelheimer Oberkreide. — *Abh. bayer. Akad. Wiss.* N. F. 45 : 1-218, pls. 1-17.

DE COSSIGNY.

1877. Note rectificative sur le terrain crétacé inférieur du département du Cher. — *Bull. Soc. géol. Fr.* (3), 5 : 321-325.

DEICKE, H.

1876. Beiträge zur geognostischen und paläontologischen Beschaffenheit der unteren Ruhrgegend. 1. Beitrag : Die Tourtia in der Umgegend von Mülheim a.d. Ruhr. — *Beilage 23 Jahresber. Realschule I Ordnung Mülheim/Ruhr.* Bivalvia : 25-29.

DEFRANCE, M. J. L.

1825. Dictionnaire des sciences naturelles. — Strasbourg et Paris. « Peigne » : 234-268.

DESHAYES, G. P.

- 1830-1832. Histoire naturelle des vers ... T. II, III. — *Encyclopédie méthodique.*

DHONDT, A. V.

- 1972a. Systematic Revision of the *Chlamydinæ* (*Pectinidae*, *Bivalvia*, *Mollusca*) of the European Cretaceous. Part 1 : *Camptonectes*. — *Bull. Inst. r. Sci. nat. Belg.* 48 : 3 : 1-60, pls. 1-3.

- 1972b. Part 2 *Lyropecten*. — *Bull. Inst. r. Sci. nat. Belg.* 47, 7 : 1-81, pls. 1-3.

1973. Part 3. *Chlamys* and *Mimachlamys*. — *Bull. Inst. r. Sci. nat. Belg.* 49, 1 : 1-134, textfigs 1-2, pls. 1-9.

DIBLEY, G. E.

1918. Additional notes on the Chalk of the Medway Valley, Gravesend, West Kent, North-East Surrey and Grays (Essex). — *Proc. Geol. Ass.* 29 : 68-93, pls. 7-10.

DUJARDIN, F.

1837. Mémoire sur les couches du sol en Touraine et description des coquilles de la craie et des faluns. — *Mém. Soc. géol. Fr.* (1), 2 : 211-311, pls. 15-23.

DUNCAN, P. M.

1869. Note on the Echinodermata, Bivalve Mollusca, and some other fossil species from the Cretaceous Rocks of Sinai. — *Q. Jl geol. Soc. Lond.* 25 : 44-46.

## FABRE-TAXY, S.

1959. Les ensembles faunistiques du Cénomaniens et du Turonien de Provence *in*: Colloque sur le Crétacé supérieur français. — *C. R. Congr. Soc. sav. Sect. Sci. Sous-sect. Géologie* 1959 : 163-170.

## FAVRE, E.

1869. Description des Mollusques fossiles de la craie des environs de Lemberg en Galicie. — Genève et Bâle, pp. VI-XII, 1-187, pls. 1-13.

## FAVRE, J.

1918. Catalogue illustré de la collection LAMARCK. Première partie. Fossiles : Conchifères monomyaires fossiles II. — Pls. 3-12.

## FOURNEL, A.

1849. Richesse minérale de l'Algérie. — Paris.

## FRECH, F.

1916. Geologie Kleinasiens im Bereich der Bagdadbahn. Ergebnisse eigener Reisen und paläontologische Untersuchungen. — *Z. dt. geol. Ges.* 68 : 1-325, pls 1-24, 3 maps, textfigs, 1-5.

## FRITSCH, A.

1911. Studien im Gebiete der böhmischen Kreideformation. Ergänzung zu Band I : Illustriertes Verzeichniss der Petrefacten der cenomanen Koryzener Schichten. — *Arch. naturw. LandDurchforsch. Böhm.* 15, 1 : 3-101, textfigs. 1-417.

## GASTER, C. T. A.

1924. The Chalk of the Worthing District, Sussex. — *Proc. Geol. Ass.* 35 : 89-110, pl 8.

## GEINITZ, H. B.

- 1839-1842. Charakteristik der Schichten und Petrefacten des sächsisch-böhmischen Kreidegebirges. — I, 1839 : 1-28, II, 1840 : 31-60, 1842 : 63-116, pls. 1-24.  
1845-1846. Grundriss der Versteinerungskunde. — Dresden und Leipzig, pp. 1-813, pls. 1-28.  
1849-1850. Das Quadersandsteingebirge oder Kreidegebirge in Deutschland. — 1849 : 1-96, pls. 1-6, 1850 : 97-292, pls. 7-12, Freiberg.  
1872. Das Elbthalgebirge in Sachsen; der untere Quader. V. Brachiopoden und Pelecypoden. — *Palaeontographica* 20, 1 : 147-276, pls. 35-45.

## GIEBEL, C.

1866. Repertorium zu Goldfuss' Petrefakten Deutschlands. Ein Verzeichnis aller Synonymen und literarischen Nachweise zu den von Goldfuss abgebildeten Arten. — Leipzig, pp. 1-122.

## GOLDFUSS, A.

- 1833-1835. *Petrefacta Germaniae*. — V. II, pp. 1-68, pls. 72-97 (1833), pp. 69-140, pls. 98-130 (1835), pp. 141-224, pls. 131-145 (1837), pp. 225-312, pls. 146-199 (1840).

## GRIEPPENKERL, O.

1889. Die Versteinerungen der Senonen Kreide von Königslutter in Herzogthum Braunschweig. — *Paläont. Abh.* 4 : 5-116, pls. 1-12.

## HAENTZSCHEL, W.

1933. Das Cenoman und die *Plenus*-Zone der sudetischen Kreide. — *Abh. preuss. geol. Landesanst.* N. F. 150 : 5-161, 4 pls., 7 textfigs.

## HAGENOW, F. VON

1842. Monographie der Rügen'schen Kreideversteinerungen III. Mollusken. — *Neues Jb. Miner. Geol. Paläont.* 1842 : 528-575, pl. 9.

## HEWITT, H. D.

1924. Notes on some chalk-sections in the district around Thetford, Norfolk. — *Proc. Geol. Ass.* 35 : 220-244.

## HOLZAPFEL, E.

1889. Die Mollusken der Aachener Kreide. II. *Lamellibranchiata*. — *Palaeontographica* 35 : 139-268, pls. 8-29.

HUME, W. F.

1897. The Cretaceous Strata of County Antrim. — *Q. Jl. geol. Soc. Lond.* 53 : 540-606.

JAHN, J. J.

1904. Vorläufiger Bericht über die Klippenfazies in böhmischen Cenoman. — *Verh. geol. Reichsanst* 14 : 297-303.

JESSEN, A. & ØDUM, H.

1923. Senon og Danien ved Voxlex. — *Danm. geol. Unders.* (2), 39 : 1-73, pls. 1-2.

KNER, R.

1852. Neue Beiträge zur Kenntniss der Kreideversteinerungen von Ost-Galizien. — *Denkschr. Akad. Wiss. Wien* 3 : 293-334, pls. 15-17.

KOKOSZYNSKA, B.

1931. Sur la faune, les faciès et la stratigraphie du Cénomanien de la Podolie. — *Biul. pànst. Inst. geol.* 6 : 629-695, pl. 14, 2 textfigs.

KUNTH, A.

1863. Ueber die Kreidemulde bei Lähn in Niederschlesien. — *Z. dt. geol. Ges.* 15 : 714-745, pl. 21.

LAMARCK, J. B. DE

- 1815-1822. Histoire naturelle des animaux sans vertèbres ... *Bivalvia*. — 1818 : v. 5 : 424-612, 1819 : v. 6 : 1-233.

MARLIÈRE, R.

1939. La transgression albienne et cénomanienne dans le Hainaut. — *Mém. Mus. r. Hist. nat. Belg.* 89 : 1-440, pls. 1-8.

MICHAEL, R.

1893. Cenoman und Turon in der Gegend von Cudowa in Schlessien. — *Z. dt. geol. Ges.* 45 : 195-252, pl. 5.

MICHALET, A.

1901. Le Cénomanien des environs de Toulon et ses Echinides. — *Bull. Soc. géol. Fr.* (4), 1 : 574-589.

MOORE, R. C. Ed.

1969. Treatise on Invertebrate Paleontology. — Part N, v. 1, Mollusca 6, Bivalvia . *Pectinidae* : pp. N 348-N 373, figs. C 72-C 94.

MORRIS, J.

1854. A Catalogue of British Fossils. — 2nd Ed., pp. 1-372.

MUELLER, J.

1859. Monographie der Petrefacten der Aachener Kreideformation. — Supplementheft, pp. 1-32, 2 pls.

NICOLESKO, C. P.

1929. Découverte du Cénomanien dans la vallée de Ganzeville (Seine-inférieure). — *C. R. Acad. Sci. Paris* 189 : 770-773.

ØDUM, H.

1926. Studier over Daniet i Jylland og paa Fyn. — *Danm. geol. Unders.* (2), 45 : 1-306, pls. 1-3.

ORBIGNY, A. D'

- 1844-1847. Paléontologie française. Description des Mollusques et Rayonnés fossiles. Terrains crétacés. III. Lamellibranches. — 1844 : 1-288, pls. 237-343; 1845 : 289-448, pls. 344-386, 1846 : 449-520, pls. 387-413; 1847 : 521-807, pls. 414-489.
1850. Prodrome de Paléontologie stratigraphique universelle des animaux mollusques et rayonnés. II. *Bivalvia cretacica*. — pp. 72-84, 117-120, 135-139, 157-171, 194-198, 233-257.

PASTERNAK, S. I., GAVRISHILIN, V. I., GINDA, V. A., KOTSYUBINSKY, S. P., SENKOVSKY, I. M.

1968. The stratigraphy and fauna of the Cretaceous deposits of West Ukraine (without the Carpathians). — Kiev, pp. 1-272, pls. 1-50, textfigs. 1-49.

## PERON, A.

1890-1891. Descriptions des Mollusques fossiles des terrains crétacés de la région sud des hauts plateaux de la Tunisie recueillis en 1885 et 1886. Deuxième partie : Exploration scientifique de la Tunisie. — Paris, pp. 105-327, pls. 23-39.

## PICTET, F. J. &amp; CAMPICHE, C.

1868-1871. Descriptions des fossiles du terrain crétacé des environs de Ste-Croix. *Matér. Paléont. Suisse* (5), 4 : *Pectinidae* : 178-255, pls. 157-181.

## POZARYSKI, W.

1938. Senonstratigraphie im Durchbruch der Weichsel zwischen Rachow und Putawy in Mittelpolen. — *Biul. Inst. geol.* 6 : 1-94, 1 table.

## PUGGARD, C.

1852. Geologie der Inseln Møen : eine Untersuchung über die Umwälzungen der Kreide und der Glacialbildung. — pp. 1-116, pls. A, B, 1-4, textfigs. 1-18.

## PULTENEY, R.

1813. Catalogue of the Birds, Shells, and some of the more rare Plants of Dorsetshire. — *Fossils* : pp. 107, 108, pl. 7.

## PUSCH, G.

1837. Polens Paläontologie oder Abbildung und Beschreibung der vorzüglichsten und der noch unbeschriebenen Petrefacten aus den Gebirgsformationen in Polen, Volhynien und den Karpathen nebst einigen allgemeinen Beiträgen zur Petrefactenkunde und einem Versuch zur Vervollständigung des Europäischen Auer-Ochsen. — Stuttgart, pp. 1-218, pls. 1-16.

## PUTZER, H.

1942. Die oberste Kreide bei Bochnica a.d. mittleren Weichsel. — *Zentbl. Miner. Geol. Paläont.* 1942 B : 361-377.

## RAVN, J. P. J.

1902. Molluskerne i Danmarks Kridtaflejringer. I. Lamellibranchiater. — *K. danske Vidensk. Selsk. Skr.* (6) 11 : 69-140, pls. 1-4, 1 map.

1918. Kridtaflejringerne paa Bornholms Sydvestkyst og deres Fauna. II. Turonet. *Danm. geol. Unders.* (2), 31 : 1-37, pls. 1-2.

1921. Kridtaflejringerne paa Bornholms Sydvestkyst og deres Fauna. III. Senonet. IV. Kridtaflejringerne ved Stampe. — *Danm. geol. Unders.* (2), 32 : 1-52, pls. 1-3.

1946. Om nyker-omraadets Kridtaflejringer. — *Biol. Skr.* (4)-6 : 1-36, pl. 1.

## REUSS, A. E.

1845-1846. Die Versteinerungen der böhmischen Kreideformation. — 1845 : I : pp. 1-58, pls. 1-13, 1846 : II : pp. 1-148, pls. 14-51.

## ROEMER, F. A.

1840-1841. Die Versteinerungen der norddeutschen Kreidegebirges. — 1840 : pp. 1-48, 1841 : pp. 49-146, pls. 1-16.

## ROGALA, W.

1909. Ueber einige Lamellibranchen aus dem Lemberg-Nagorzanyer Senon. — *Bull. int. Acad. Sci. Lett. Cracovie* 1909 : 689-703, pl. 1.

1911. Ein Beitrag zur Kenntniss der Mukronatenkreide der Gegend von Lemberg. — *Kosmos* (Lwow) 36 : 487-499, pl. 1.

## ROWE, A. W.

1903. The Zones of the White Chalk of the English Coast. III. Devon. — *Proc. Geol. Ass.* 18 : 1-51, pls. 1-13.

1908. The Zones of the White Chalk of the English Coast V. The Isle of Wight. The White Chalk of the Isle of Wight. — *Proc. Geol. Ass.* 20 : 209-352, pls. 8-23, maps. A-F.

## SCHLOTHEIM, E. T., VON

1820-1823. Die Petrefactenkunde und Nachträge zur Petrefactenkunde. — Gotha, pp. 1-437, III-LXII.

## SCUPIN, H.

1912-1913. Die Löwenberger Kreide und ihre Fauna. — *Palaeontographica*, Supplement 6 : 5-275, pls. 1-15.



SOBETSKI, V. A.

1960. Contributions to the systematics of the Upper Cretaceous *Pectinidae* from the middle part of the Dniester River Basin. — *Paleont. Zh.* 1960, 2: 63-71, 1 pl.

1961. Upper Cretaceous *Pectinacea* from the middle part of the Dniester River Basin, their systematic composition and their ecological significance. — Kishinev, pp. 1-95, textfigs. 1-23, pls. 1-6.

SOWERBY, J. & SOWERBY, J. D. C.

1812-1846. The Mineral Conchology of Great Britain; or coloured figures and descriptions of those remains of testaceous animals or shells which have been preserved at various times and depths in the earth. — London, 7 vols.

STOLICZKA, K.

1871. Cretaceous Fauna of Southern India. — *Mem. geol. Surv. India, Palaeont. indica*, v. III, ser. VI. The Pelecypoda. *Pectinidae*: pp. 423-439, pls. 31, 32, 37, 40, 41, 42, 44.

SVOBODA, J. et al.

1966. Regional Geology of Czechoslovakia. Part I. The Bohemian Massif. — *Geol. Surv. Czechoslovakia*, Prague.

TEPPNER, W. VON

1922. *Lamellibranchiata tertiaria Anisomyaria* II. — *Fossilium Catalogus I. Animalia*, pars. 15: 66-296.

TSCHIRWINSKY, P. N.

1913. Der geologische Bau der Gegend des rechten Ufers des Flusses Seim innerhalb des Gouvernement Kursk. — *Zap. kiev. Obshch. Estest.* 23: 1-142, pls. 1-3.

VAN DER WEIJDEN, W. J. M.

1943. Die Macrofaune der Hervenschen Kreide mit besonderer Berücksichtigung der Lamellibranchiaten. — *Meded. geol. Sticht.* Ser. C, IV, 2, № 1: 1-139, pls. 1-15, textfigs. 1-3.

VOGEL, F.

1895. Beiträge zur Kenntniss der holländischen Kreide. — *Samml. geol. Reichsmus. Leiden* N. F. 2, 1: 1-64, pls. 1-3.

WOLANSKI, D.

1932. Die Cephalopoden und Lamellibranchiaten der Ober-Kreide Pommerns. — *Abh. geol.-paläont. Inst. Greifswald* 9: 1-72, pls. 1-5, textfigs. 1-7, tables 1-5.

WRIGHT, C. W. & WRIGHT, E. V.

1942. The Chalk of the Yorkshire Wolds. — *Proc. Geol. Ass.* 53: 112-127, textfig. 8.

WOODS, H.

1902-1903. A Monograph of the Cretaceous Lamellibranchia of Engand. V. 1. — *Palaeontogr. Soc. (Monogr.): Pectinidae*: 145-232, pls. 27-52 (pp. 145-196, 1902, pp. 197-232, 1903).

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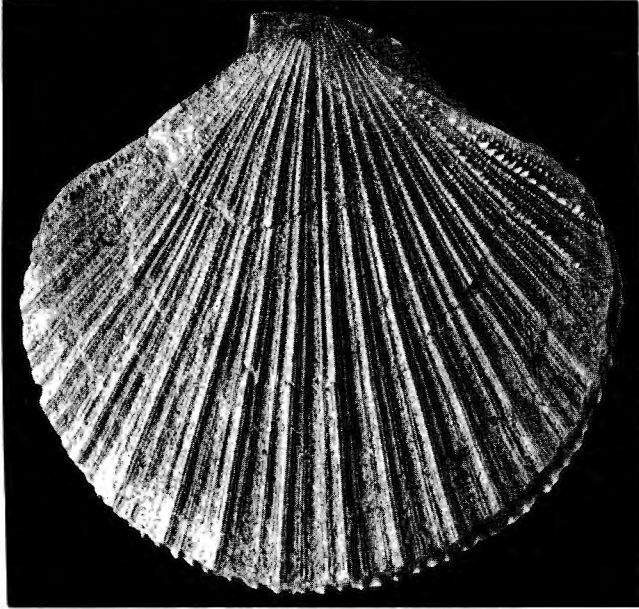
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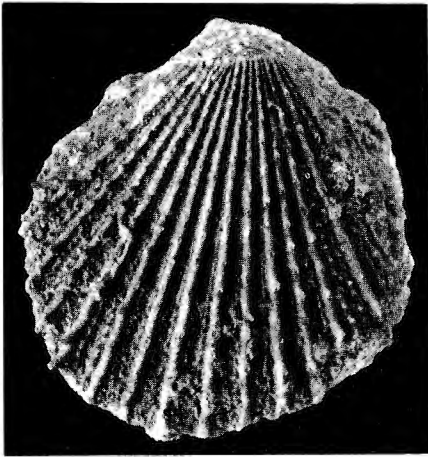
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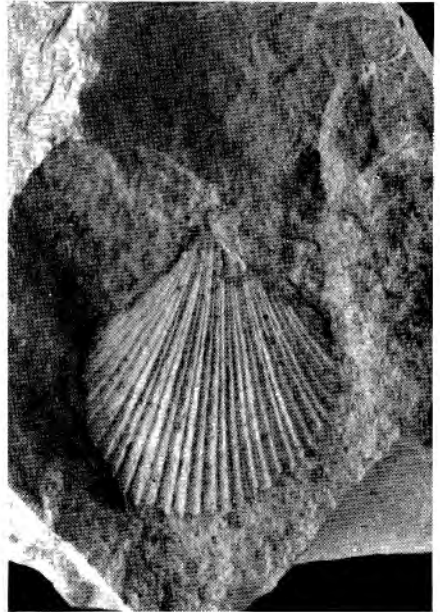
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1 A

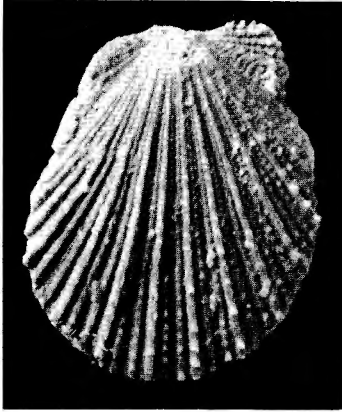


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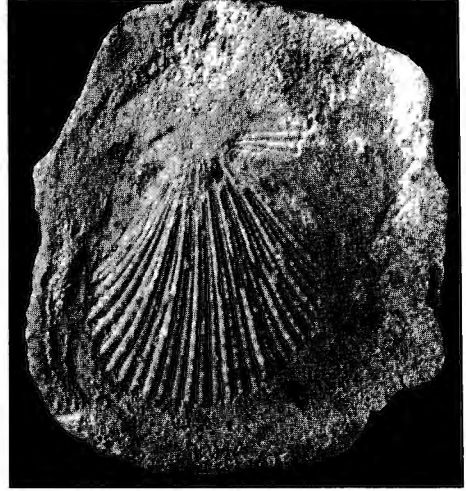


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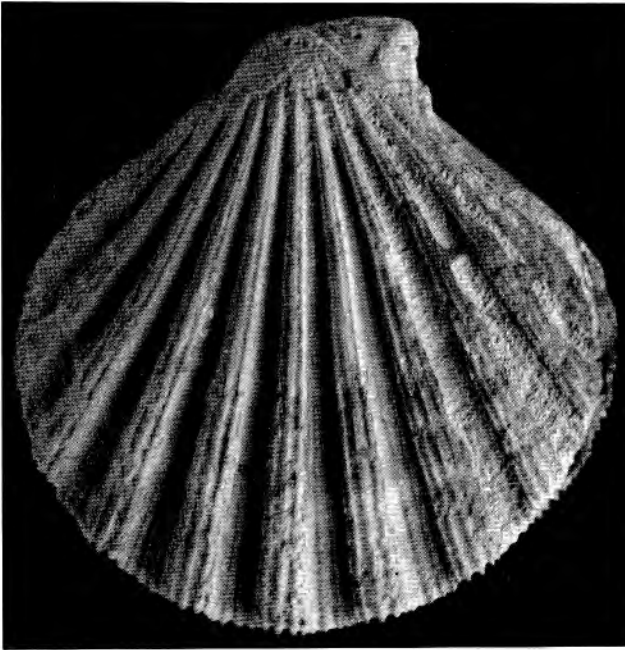




1 A



1 B



2 A



2 B

Annie V. DHONDT. — Systematic Revision of the *Chlamydinae*  
(*Pectinidae*, *Bivalvia*, *Mollusca*) of the European Cretaceous.  
Part 4 : *Merklinia*.





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## EXPLANATION OF PLATES

## PLATE I

*Merklina aspera* (J. B. DE LAMARCK)

- Fig. 1a. — From the Cenomanian (Meule de Bernissart) of Bernissart, Hainaut, Belgium), right valve,  $\times 1$  (T. C. M. I. 9819).
- Fig. 1b. — From the Cenomanian between Dives and Villers, Calvados, France; right ? valve,  $\times 4$  (T. C. M. I. 9869).

*Merklina variabilis* (F. VON HAGENOW).

- Fig. 2. — From the Maastrichtian of Beutenaken, Limburg, The Netherlands; left ? valve,  $\times 2$  (T. C. M. I. 9859).

## PLATE II

*Merklina variabilis* (F. VON HAGENOW)

From the Maastrichtian near Maastricht, The Netherlands

- Fig. 1a. — Right valve,  $\times 6$  (T. C. M. I. 9883).
- Fig. 1b. — Right valve,  $\times 3$  (T. C. M. I. 9881).

*Merklina perornata* (J. COTTREAU)

- Fig. 2a. — From the Maastrichtian of Lokia, Malagasy Republic; left valve,  $\times 4$  (holotype of COTTREAU, Muséum national d'Histoire naturelle, Paris).
- Fig. 2b. — From the « Senonian » at Ambondra, Malagasy Republic; lunulate area at the auricle bases, posterior side of right valve,  $\times 4$  (hypotype of BASSE, Muséum national d'Histoire naturelle, Paris).

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