EOCENE AND OLIGOCENE OSTRACODA

OF BELGIUM

STRATIGRAPHY.

A brief survey will be given of the stratigraphic units of the Eocene and Oligocene, as they are found in Belgium. The data were chiefly derived from the literature. For extensive descriptions and more detailed surveys one is referred to the publications listed at the end of this chapter.

YPRESIAN (DUMONT, 1849).

In Belgium the transgression of the Ypresian is said to follow after the emersion period of the Upper-Landenian (= Paleocene). The lower part of the Ypresian is composed of clays, generally poor in fossils; in western Belgium they reach a thickness of 150 m. The clay is plastic, with silty intercalations, and it contains pyrite and gypsum. It is more silty or sandy in Hainaut.

On top of these basal clays lie somewhat clayish, glauconitic sands, the so-called sands of Mons-en-Pévèle. Fossiliferous sandstones, rich in nummulites (*N. planulatus*) occur in the upper part of these sands.

The next, higher complex of sediments was called Paniselian (after the Mont-Panisel near Mons) by DUMONT (1851). It is a complex, in which the most usual succession from bottom to top consists of : clay, sandy clay and sand with sandstone intercalations. With a few exceptions, this complex is only known from western Belgium, e.g. west of the river Senne. Nowadays, the Paniselian is supposed to belong, entirely or for its greater part, to the Upper Ypresian.

LUTETIAN (DE LAPPARENT, 1883).

In central Belgium this comprises a complex of fine-grained to coarse, quartz sands, calcareous or not, with locally sandstone banks and (or) irregular concretions. Cross-bedding, current- bedding, and intraformational breccias are frequently met with. In eastern Belgium the Lutetian is composed of coarse, glauconitic sand, with a conglomerate at its base. No unquestionable Lutetian is known from western Belgium.

DUMONT (1851) called this the Bruxellian stage. After it had been established that the Bruxellian only represents the lowest part of the Lutetian (e.g. zone with *Maretia omaliusi*) as defined in the Paris Basin, belgian geologists prefer the name Lutetian. The four higher zones of the Lutetian in the Paris Basin, are for the greater part lacking in Belgium. Reworked remainders and fossils of the second zone (with *Nummulites laevigatus*) and possibly of still higher zones are present in the basal layer of the Ledian.

LEDIAN (MOURLON, 1887).

After the emersion of the Upper Lutetian, the Ledian sea coming from the North, transgressed over large parts of Belgium.

The base is formed by a layer of variable thickness, that contains pebbles, or coarse sand, in which reworked elements of the Lutetian have been found. On top of that comes a complex of sands (approx. 10 m), generally calcareous and more or less glauconitic. In these sands discontinuous layers of standstone, often rich in nummulites (*N. variolarius*) occur.

The emersion-period, preceding the Bartonian transgression, is not everywhere clearly indicated in Belgium.

BARTONIAN (MAYER, 1857).

In Belgium the Bartonian is represented by the sands of Wemmel (Wemmelian of VINCENT and RUTOT 1878) and the superimposed clay of Asse (Asschian of RUTOT 1882). The sands of Wemmel are supposed to be the nearshore facies of the Bartonian. These sands become gradually thinner in western direction, towards the interior of the basin. They are glauconitic and rich in fossils, amongst other things nummulites (*N. wemmelensis*). The clay is also rich in glauconite and it contains an impoverished remainder of the fauna of the sands. The Bartonian is covered by transgressive Tongrian deposits.

LOCALITIES.

YPRESIAN.

RA (253, 254, 1071, 1072. Brick-works of « De Simpel Bros. » at Kortemark (1 200 m S of church-tower of Kortemark). Dark-gray, very silty clay (*Y1a*).

YC (293). Clay-pit at Rumbeke (4 200 m S-500 m W of church-tower of Rumbeke). Blue-gray, somewhat silty clay (*Y1a*).

KA (1092, 1093). Luingne, clay-pit of « Briquetteries Modernes » (950 m E of Luingne church). Gray-brown, silty clay with remains of molluscs (*Y1b*).

CO (1241). Canal, cutting into the Crête de Partage (1 500 m N of Godarville church-tower). Gray-green, silty clay with mollucs, *Lingula* and nummulites (*Y1b?*).

MMV (79, 80, 1201). Samples from banks along the road side in the Bois-de-la-Haut near Hyon (400 m S-700 m E of Hyon church). Gray-green, fairly fine-grained, glauconitic sand, with mollusc remains and nummulites (*Y1b*).

DE (1204). Sample from roadside near Maulde (750 m N-1 050 m W of Maulde church). Gray-green, glauconitic sand containing limestonebank with nummulites (*Y1b*).

DH (1208-1212). Hollow road on the Mont-Saint-Aubert (700-450 m N-500 to 600 m E of church of Mont-Saint-Aubert). Gray-green, fine-grained, glauconitic, somewhat clayish sand, locally rich in nummulites and mollusc-romains (*Y1b*).

XC (1226). Hollow road in the vicinity of Frasnes-lez-Buissenal (2 150 m N-1 750 m E of church Frasnes-lez-Buissenal). Brown, silty, calcareous clay with nummulites.

BD (445). Stadium of Forest (Brussels), avenue Victor Rousseau. Indurated, grayish-green, fine-grained, glauconitic sand with numerous nummulites (*Y1b*).

BG (1026). Hollow road near Teralphene (550 m N-850 m W of the church of Teralphene). Brownish-green, medium grained, glauconitic and clayey sand with sandstone slabs containing nummulites and pelecypods (*Y2*).

LUTETIAN.

CO (1240). Godarville, canal, cutting into the Crête de Partage (1 000-1 500 m N of church of Godarville). Rather coarse, greenish-brown sand with gravel; locally calcareous and with nummulites.

BA (100-106). Saint-Job (Brussels), sand reclamation in the avenue Latérale. The outcrop was about 13 m high and has been sampled at more or less regular intervals (BA 100 at the base). White and grayish-yellow, fairly fine-grained, calcareous sand with *Ostrea cymbula* Lamk., indurated in some narrow bands and with irregularly shaped concretions (grès fistuleux).

BR (1169). Station-junction of Leopoldswijk in Brussels; sample taken near tunnel construction under rue Belliard. Yellowish-white, fine-grained, calcareous sand with some mollusc-remains.

LK (163). Hoegaarden, sand-pit (600 m N-150 m W of church of Hoegaarden). White, marly, somewhat glauconitic limestone, intercalated in glauconitic, rather coarse, current-bedded sand with mollusc-remains. 2 m below the Quaternary loess.

LAE (1130). Hollow road near Blanden (250 m S-350 m E of church of Blanden). White, fine-grained, calcareous sand with mollusc remains and sponge spicules. Ledian according to Geological Map.

BC (113-117). Diegem, sand-pit (500 m W of church of Diegem), exposure 11 m high. Samples with regular intervals. Grayish-yellow, fine-grained calcareous sand with many mollusc remains; with discontinuous limestone banks. No. 113 is the lowermost sample.

NC (405-407). Sand-pit « Flamand » at Braine-l'Alleud (500 m S-250 m E of church of Braine-l'Alleud). Grayish-green, fine-grained, slightly glauconitic, calcareous sand.

NS (1178). Abandoned sand-pit at Henripont (50 m N-400 m E of church of Henripont). White to brown, fine-grained, somewhat glauconitic sand with disperse soft sandstone, indurated at some places.

BD (391-393, 1255). Stadium of Forest (Brussels) at the avenue Victor Rousseau (samples 391-393). In September 1954 there was an exposure of whitish sand with irregular concretions (grès fistuleux), overlain by a yellow, calcareous sand-complex with discontinuous sandstone layers and with nummulites (the samples were taken from the latter). 1255 : see Ledian.

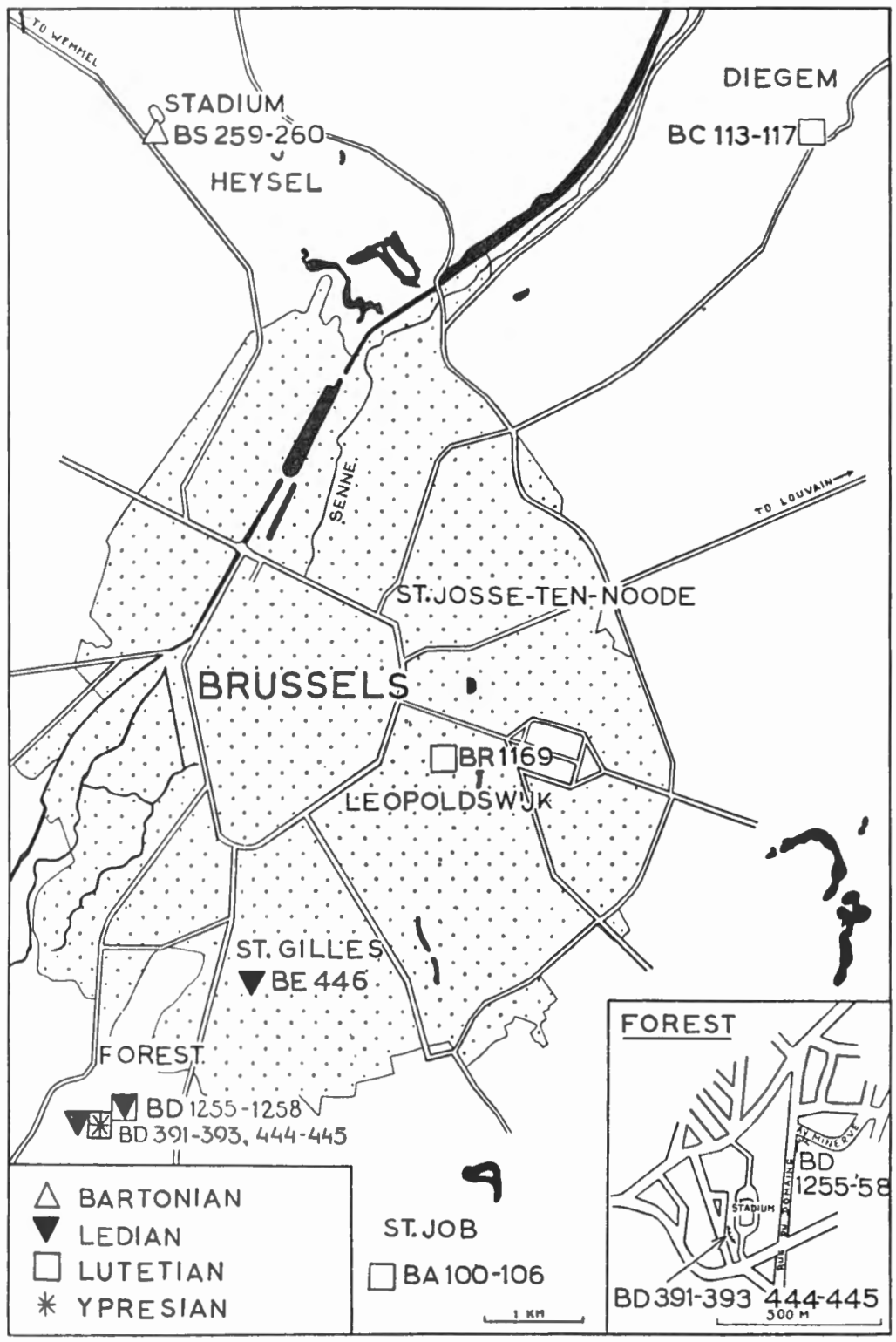

FIG. 1. — Region of Brussels with sampled localities.

ND (410-411). Roadside near Genappe, on the route nationale No. 5 (Brussels-Charleroi) (650 m N of church of Genappe). Light-gray fine-grained, calcareous sand with some slabs of sandstone.

WA (164-165). Gobertange, small mine (depth 17 m) for reclaiming the « grès de Gobertange » (1 000 m N-1 000 m E of church of Lathuy). Samples taken from two limestone banks (situated 70 cm one from the other) with internal moulds of *Lucina volderiana* NYST and *Nautilus*.

NNA (1151-1152). Abandoned sand-pit at Spy (850 m N-700 m E of church of Spy). The exposed sand is for the greater part decalcified. Samples were taken from two bodies of white, fine-grained calcareous sand with remains of molluscs and echinoids.

THI; (1189-1193). Abandoned sand-pit at Nalinnes (100 m N-600 m E of church of Nalinnes). 7,50 m of yellowish-white, fine- to medium- grained, calcareous sand with glauconite in the upper part. Many bryozoans, further nummulites, echinoids and shark's teeth. In the sand there are discontinuous calcareous sandstone layers with moulds of *Lucina volderiana* Nyst.

LEDIAN.

BE (446). Prison at Saint-Gilles (Brussels). Sample, containing nummulites and mollusc remains, from the collection of the Geological Institute at Utrecht, labeled : « Basis Lédien, gravier d'immersion ».

BD (1255-1258). Hollow roadside, corner avenue du Domaine-avenue Minerve at Forest (Brussels). Near the base of the 2,50 m high outcrop, there is an indurated layer, some 30 cm thick, with worn nummulitcs, mollusc remains and shark teeth, considered to be the basal layer of the Ledian. From this layer the samples 1256 and 1257 were taken. Sample 1255 came from the underlying light-yellow, medium to fine-grained calcareous sand of the Lutetian. Sample 1258 came out of the greenish-white, fine-grained, glauconitic, calcareous sand above the indurated layer.

BD (444). Stadium of Forest (Brussels) at the avenue Victor Rousseau. Sample in the collection of the Geological Institute of Utrecht. Green, glauconitic sand with nummulites and *Pecten*.

BL (1035). Hollow roadside at Asse (100 m S-1 500 m W of the church of Asse). Whitish-yellow, fine-grained, slightly glauconitic, calcareous sand.

BM (1036, 1037). Hollow roadside near Asse (1 600 m W of Asse church). Yellow-white, fine-grained, slightly glauconitic, calcareous sand.

MC (1040). Abandoned sand-pit near Meldert (100 m E of Meldert church). Yellow-white, fine-grained, calcareous sand with mollusc remains (*Ostrea*, *Pecten*) and nummulites. Locally with discontinuous calcareous sandtsone layers.

ZD (340-343, 1011-1017). Sand-pit « Steenberg » near Bambrugge (200 m N-1 000 m E of Bambrugge church). Sampled in September 1953 an May 1954. 2,50 m high exposure of greenish-yellow, medium-grained, glauconitic and calcareous sand with nummulites and mollusc remains (among others *Solarium*, *Pecten*, *Ostrea*). There is a 30 cm thick layer of calcareous sandstone.

ZB (1021A, 1022). Sand-pit near Vlierzele (800 m N-200 m W of Vlierzele church). Exposure of Ledian overlying the Upper Ypresian. At its base the Ledian contains a lens, rich in lime, from which the samples were taken. Grayish-white, medium-grained, glauconitic, calcareous sand with nummulites and mollusc remains.

ZG (1025). Hollow roadside near Balegem (400 m S-750 m E of church of Balegem). Greenish-white, fine-grained, slightly glauconitic, calcareous sand with nummulites and mollusc remains.

ZA (583). Garden of the University Library in Gent. Yellowish-gray, fine-grained, glauconitic sand with nummulites, *Ostrea* and *Solarium*.

BARTONIAN.

BS (1259, 1260). Hollow roadside of the rue du Marathon at Heizel, about 200 m S of the stadium. Yellowish-green, medium-grained fossiliferous sand, with nummulites (sands of Wemmel).

ZA (1242, 1243). Samples from foundation construction of the Geological Institute of Gent, received by intermediacy of Mr. R. Maréchal. Grayish-green, glauconitic sands with nummulites and mollusc remains (sand of Wemmel).

From the collection of the Belgian Geological Survey at Brussels the following material of the borings Brussegem [No. 72 E, 75 (VIII)] and Heist-op-den-Berg [No. 59 E, 140 (II)] was available :

Boring Brussegem (50 m N-50 m E of church of Brussegem).

17,20-17,60 m : greenish-gray, fine-grained sand with nummulites.
17,60-18,20 m : greenish-gray, fine-grained sand with nummulites.
18,20-19,20 m : greenish-gray, fine-grained sand with nummulites.
20,25-21,30 m : greenish-gray, fine-grained sand with nummulites.
22,20-23,25 m : gray, medium-grained sand with nummulites and molluscs.
23,25-24,20 m : greenis-gray, fine-grained, slightly clayish sand with mollusc remains.
24,20-25,10 m : gray, fine-grained sand with nummulites.
25,10-25,90 m : gray, fine-grained sand with nummulites.

Boring Heist-op-den-Berg (near Government Secondary School).

Samples from 121,50, 122, 124, 126, 128, 128,50, 129, 129,50 m depth were examined. Fine-grained, glauconitic, calcareous sand with nummulites and mollusc remains (sands of Wemmel), exepting the samples from 129 and 129,50 m, which contain less glauconite and are coarser and of grey colour (probably Ledian).

BRB (246, 1054-1057). Clay-pit at Oedelem of the « N. V. Steenbakkerij van Oedelem » (100 m S-450 m E of Oedelem church).
12 m high exposure of glauconitic clay, containing at its base many nummulites and mollusc remains (*Pecten corneus*). Only in this layer ostracods were found (clay of Asse).

GB (1109). Hollow roadside near Grotenberge (1 300 m E of church of Grotenberge). Green-gray, slightly silty clay (clay of Asse).

OLIGOCENE.

TONGRIAN (DUMONT, 1849).

The Tongrian was introduced by DUMONT in 1839, but in a much wider sense than it is used today. In 1849 DUMONT divided the Tongrian into Tongrian s.s., Rupelian and Bolderian.

The Lower Tongrian deposits are marine; they are composed of sands, which in most cases contain glauconite and mica. The lowermost part is more clayey. The sands of Grimmertingen (10-20 m) with *Ostrea ventilabrum* GOLDF., and the sands of Neerrepen (± 10 m) belong to the Lower Tongrian.

The Upper-Tongrian is largely brackish, and it contains numerous molluscs, a.o. *Cerithium*, but the fauna is poor in number of species. In the region of Tongeren the Upper Tongrian consists of the clay of Henis (6 m) and the superimposed marls and sands of Oude Biezen (2-3 m). It is generally believed that, in westward direction, these two lithologic units merge into the sands and marls of Boutersem (3-5 m) of the region of Tienen. Under the latter unit a horizon with vertebrate remains has recently been found.

Between Leuven and Tienen the Upper Tongrian is wholly or partly developed in a fluvio-marine facies, the current-bedded sands of Kerkom (± 15 m). Well-determined Tongrian in Belgium has only been found to the east of Leuven.

RUPELIAN (DUMONT, 1849, 1851).

In the region of Tongeren the basal part of the Rupelian consists of the fossiliferous sands of Berg (3-5 m) with *Pectunculus obovatus* LMK. In the region of Kleine-Spouwen the limit between Tongrian and Rupelian, i.e. between the sands of Oude-Biezen and those of Berg, should be characterized by a layer of gravel, but in the borings made by BATJES in Kleine-Spouwen nothing was found that indicates the excistence of such a layer.

In the Belgian province of Limburg one finds a sandy clay (± 5 m) with *Nucula comta* GOLDF. on top of the sands of Berg. This clay is covered by a sterile layer of sand.

The most wide-spread lithologic unit of the Belgian Oligocene, the clay of Boom, is considered to be a stille higher unit of the Rupelian. It contains, septaria, pyrite and molluscs [*Leda deshayesiana* (NYST)].

There is no paleontological evidence for outcrops in Belgium of the Upper Oligocene (Chattian).

TONGRIAN.

SG (198). Banks along the roadside at Grimmertingen (about 2 000 m S of church of Vliermaal). Mollusc horizon with *Ostrea* and *Turritella*, in grayish-green, fine-grained, slightly clayish, micaceous sand (sand of Grimmertingen, type locality).

TR (580). Sandpit at the eastern end of the Beukenberg near Tongeren (75 m N-600 m W of the basilica tower of Tongeren). Greenish-gray, fine-grained, layered sand with glauconite and mica (sand of Neerrepen).

LF (142, 143). Hoogbutsel (1 000 m N-750 m E of church of Boutersem). Grayish-green clay with *Nystia*, *Limnaea* and *Planorbis*. This clay is situated directly below the vertebrate-horizon, and on top of the sands of Neerrepen (for details, see GLIBERT and DE HEINZELIN, Inst. Roy. Sc. nat. Belg., T. XXVIII, No. 52, 1952).

LG (145, 149). Hoogbutsel, garden of Mr. VLEMINCKX (750 m N-1 200 m E of church of Boutersem). White, marly and sandy clay with partly dissolved molluscs (see GULINCK, B.S.B.G., Vol. 60, 1951, p. 208, fig. 1, layer II-III).

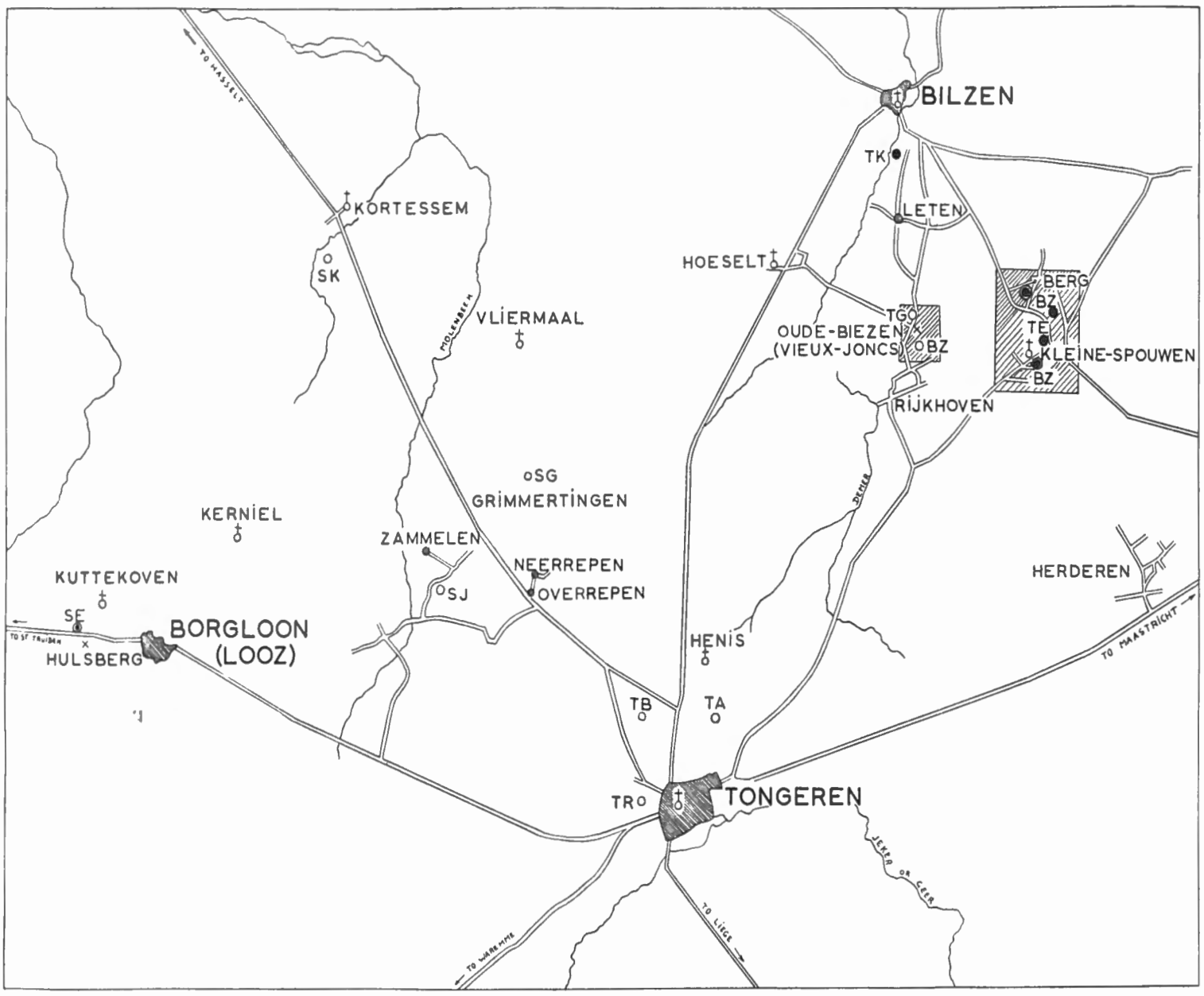

FIG. 2. — Tongeren region with localities where the Oligocene was found to contain Ostracoda.

TA (207, 209, 579). Claypit north of the station of Tongeren (1 250 m N-550 m E of the tower of the basilica of Tongeren).

207 : dark, grayish-green, plastic clay with big transparent crystals of gysum (clay of Henis).

209 : 3.30 m higher in a 10 cm thick layer of dark-brown colour (lignitic ?) (clay of Henis).

579 : greenish-gray, sandy clay, rich in molluscs (many *Cerithium*), situated at the highest point of the hill; very probably the horizon of Oude-Biezen, but reworked clay of Henis is also possible.

TB (216). Abandoned claypit near Tongeren (1 300 m N-625 m W of tower of the basilica of Tongeren). Dark, brownish-gray layer with gastropods and pelecypods, in the clay of Henis.

SJ (201). Roadside near Zammelen (100 m N-1 500 m W of church of Overrepen). Dark-gray, somewhat sandy clay with *Cerithium*, *Sinodia incrassata* and *Aloides*.

SK (570). Tile-works « Van Oostayen » at Kortessem (800 m S-200 m W of church of Kortessem). White, fine-grained sand, with a 60-70 cm thick intercalation of clay of Henis.

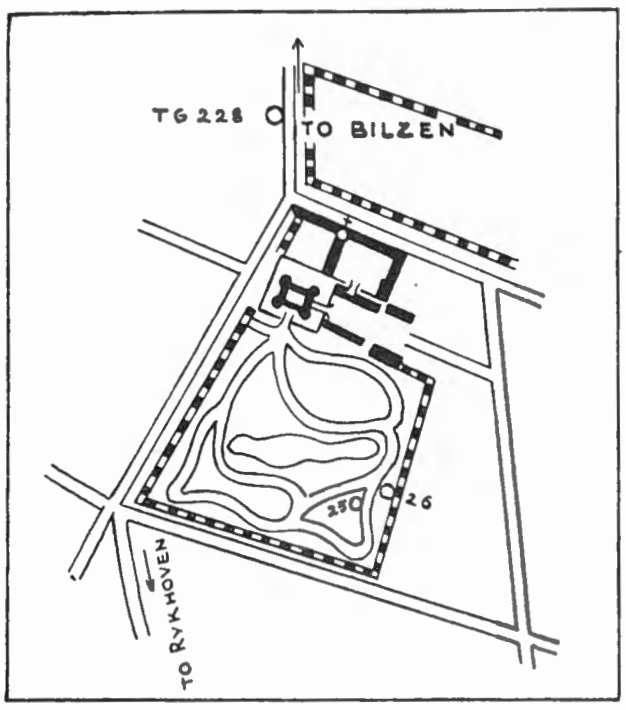

FIG. 3. — Oude-Biezen castle.

TG (228). Roadside, 150 m N-75 m W of tower of the chapel of the castle of Oude-Biezen, near Rijkhoven. Greenish-gray, somewhat sandy, fossiliferous clay (*Cerithium*, *Sinodia incrassata*, etc.) (clay of Henis).

RUPELIAN.

SE (425). Roadside near castle of Hulsberg [350 m S-450 m W of church of Kuttekoven near Borgloon (= Looz)]. Brownish-green, sandy clay, just below the sands of Berg, with *Cerithium* and *Pectunculus*.

TE (224, 427, 428). Abandoned tramway incision near Kleine-Spouwen (225 m N-250 m E of church of Kleine-Spouwen).

224, 428 : Brown sandy clay with *Nucula comta*.

427 : 20 cm lower : Yellowish-brown, clayey sand with *Pectunculus* and other molluscs (sand of Berg).

TK (522-526). Abandoned clay-pit in the Katteberg near Bilzen (700 m S of church of Bilzen). Approximately 4 m brown-gray, sandy clay with *Nucula comta*. Sample 525 was taken from a light-gray, indurated layer of 30-40 cm thickness.

BZ. In May 1954, Dr. BATJES and Mr. BOEKSCHOTEN, drilled some 40 shallow (2 m deep) holes in the neighbourhood of Kleine-Spouwen and Berg. In 34 out of 40 borings the Oligocene was met with. The others did not penetrate the base of the covering loess. The location of the borings is given on textfigures 3 and 4.

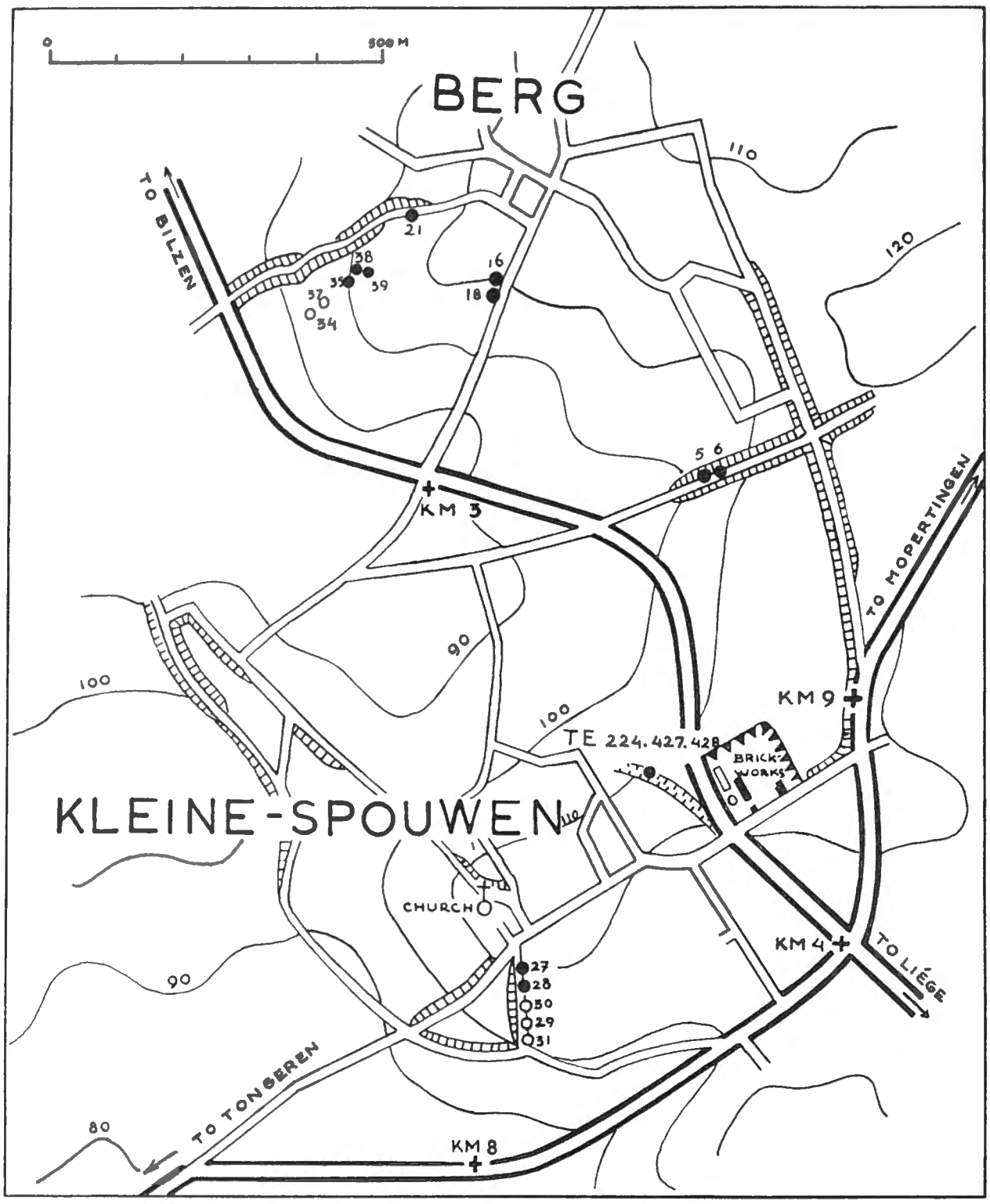

FIG. 4. — Kleine-Spouwen and Berg region with locations of the borings.

T o n g r i a n . — Two borings (No. 25 and 26) were carried out in the garden of the castle of Oude-Biezen (type-locality of the clay and sand of Oude-Biezen). In boring 25 (sample BZ 517) gray clay with *Cerithium* was found. This is either the clay of Henis or that of Oude-Biezen. The sand of Oude-Biezen was found in boring 26 (samples BZ 518, 518A-521) : this white, fine-grained, somewhat clayish sand contains a rich, brackish mollusc-fauna, mostly *Cerithium*.

The brackish Tongrian was also found in the borings BZ 29-31 at Kleine-Spouwen. This is probably again the Oude-Biezen unit. The clay of Henis was found in the borings BZ 34 and 37 at Berg, a hamlet north of Kleine-Spouwen.

Rupelian. — The sands of Berg were found in several borings near Berg and Kleine-Spouwen, but only in the borings BZ 5, 16 and 18 did it contain Ostracoda.

The clay with *Nucula comta* was found in the borings BZ 5, 6, 16, 21, 27, 28, 35, 38 and 39. It contains a beautifully preserved, but rather poor Ostracoda-fauna.

In the sands, overlying the *Nucula comta*-clay no Ostracoda were observed.

Stratigraphical data concerning the borings are given in textfigure 5; borings which did not contain Ostracoda have been omitted.

AA (657). Clay-pit of brick-works « L. Hooghe » at Schriek (1 200 m N-2 200 m W of church Schriek). Gray, silty clay with pyrite concretions and molluscs.

AE (661, 664). Clay-pit of the brick-works of « Gebr. Hermans » at Herselt (400 m N of church of Ramsel). Green-gray, clay with septaria and big pyrite-concretions.

JA (353, 355). Small clay-pit, north of the brickworks of the « N. V. Antwerpsche Machiensteenfabrieken » at Tielrode (400 m N-600 m W of church of Tielrode). Dark-gray clay with pyrite and molluscs.

JB 359-365). Clay-pit of the firm of « De Neef » at Niel (775 m S-1 700 m E of church of Niel). Alternating dark-gray plastic clay (360, 362) and dark-gray silty clay (359, 361, 363, 364), both with pyrite, septaria and rare molluscs.

JC (587). Clay-pit of the Firm of « Scheerders-Van Kerckhove » at Sint-Niklaas. Samples taken 500 m S-1 500 m W of the main church of Sint-Niklaas. Dark-gray clay with pyrite and some glauconite.

JG (610-612). Clay-pit « Nieuw-Gelaag » of the « N. V. Antwerpsche Machiensteenfabrieken » at Tielrode (600 m NNW of locality JA). Dark-gray, plastic clay with silty intercalations, septaria, pyrite-concretions and many molluscs.

JH (615-617). Clay-pit « Oud-Gelaag » at Tielrode (1 800 m W of church of Temse)

616 : gray clay with septaria and pyrite.
615, 617 : gray, silty clay with few septaria, pyrite and rare molluscs.

JJ. (619-621, 623, 624). Clay-pit at Steendorp (350 m N-500 m W of church of Steendorp). Gray clay with septatria, pyrite and molluscs.

JK (628). Abandonned clay-pit near the fortress of Kruibeke (1 800 m N-300 m E of church of Kruibeke). Gray, marly, pyritic clay with septaria.

JL (630). Clay-pit of « Mechanische Steenbakkerij Neerland » at Wilrijk (2 300 m N-300 m W of church of Aartselaar). Gray, somewhat silty clay with pyrite and molluscs.

JM (642, 644, 646). Clay-pit « Gebr. Bal » at Schelle (1 400 m S-100 m W of church of Schelle). Grayish-green, silty clay with large septaria and pyrite concretions.

MA (369, 372, 374, 648-652). Clay-pit of Firm of « Verstrepen » at Boom (500 m N-1 200 m E of church of Boom). Gray clay with septaria, pyrite and scarce molluscs (*Leda deshayesiana*).

ME (633, 634). Clay-pit of the « N. V. Steenfabrieken Rupel en Nethe » at Rumst (1 100 m N-150 m E of church of Rumst).

Dark-gray, somewhat silty clay with pyrite, septaria and molluscs.

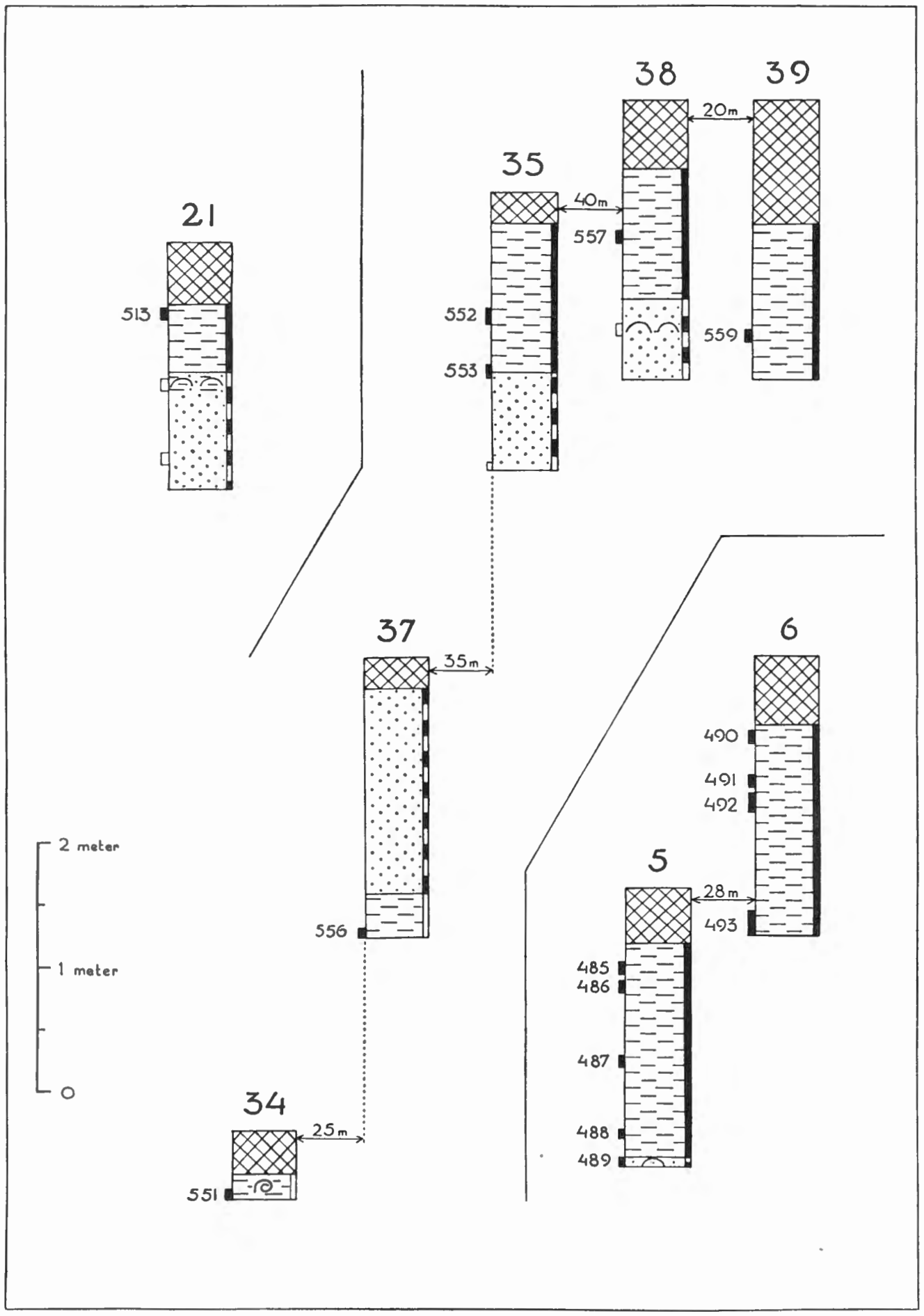

FIG. 5*a*. — Sections of the borings of Kleine-Spouwen and Berg, according to D. A. J. BATJES.

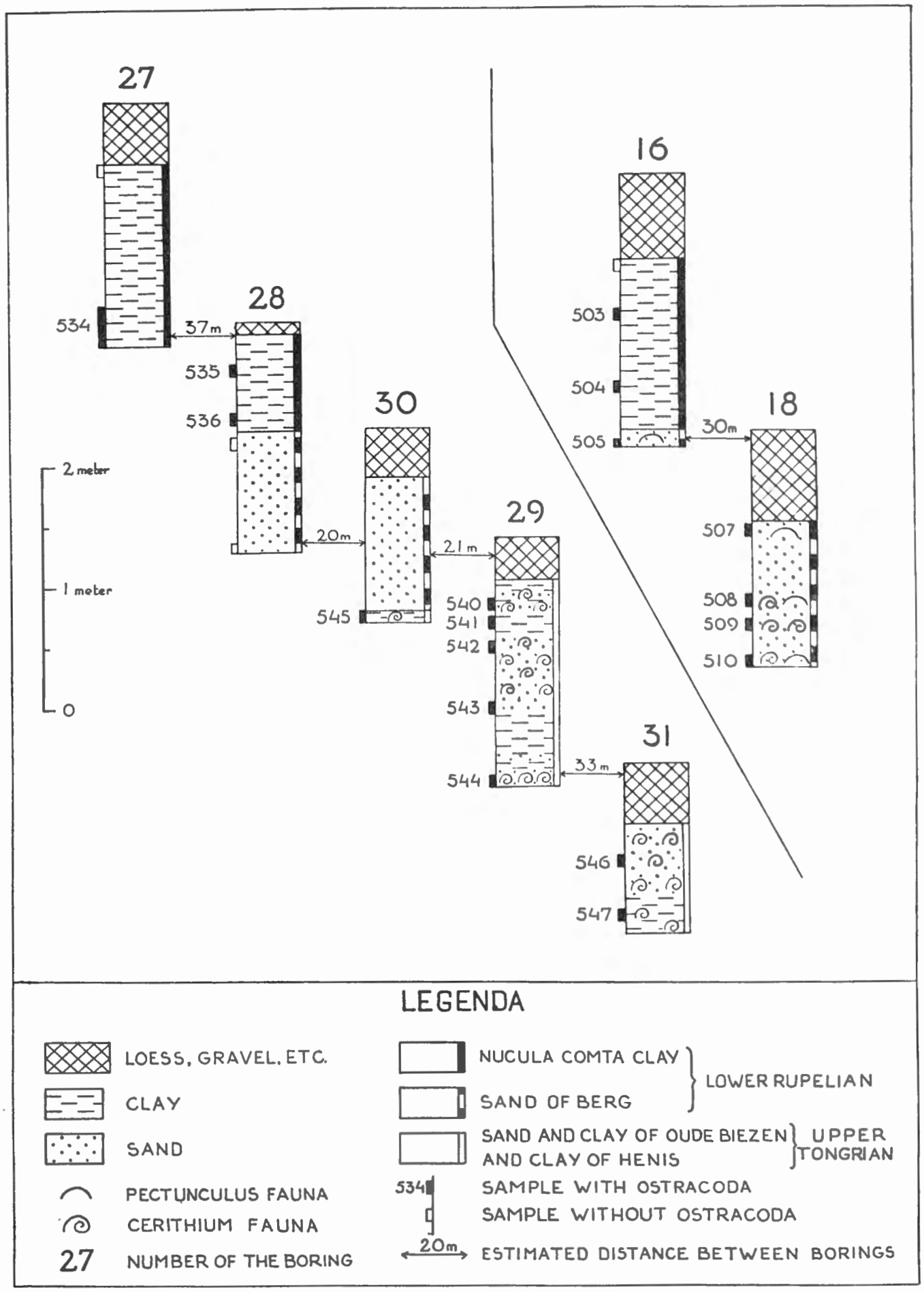

FIG. 5*b*. — Sections of the borings of Kleine-Spouwen and Berg, according to D. A. J. BATJES.

OA (598-602, 604). Clay-pit of brick-works at Stekene (450 m S-900 m E of church of Stekene). Alternating layers of plastic and of silty clay.

598 : silty caly; 599 and 604 : pastic clay.

Boring Heist-op-den-Berg. It traversed the clay of Boom from 26,50 m to 120,50 m. Only the samples from 99 to 120,50 m were investigated. The samples from 113 m and 119,5 m contained Ostracoda. Gray, slightly sandy clay with pyrite and glauconite.

ENGLAND.

The samples were collected during a field trip to the Hampshire Basin in the spring of 1949.

Barton. Samples were taken at beach-level from the cliffs at Barton (type locality of the Bartonian). For a detailed section see E. St. John Burton in Quart. Journ. Geol. Soc. 1929, pp. 223-239.

Middle Bartonian. D 1-3 : gray clay with pyrite, molluscs and otoliths (division E of E. St. John Burton).

D 4-6 : brownish clay with pyrite, molluscs, bryozoans and otoliths (division F).

Upper Bartonian. D7 : gray clay with pyrite and mollusc remains (division G).

D 8-10 : Gray clay with pyrite, some glauconite, molluscs (*Chama*) and bryozoans (division H).

Alum bay, Isle of Wight.

Lower Bartonian. Samples PQR 2, P 4 : green-gray silty clay with pyrite, corals (*Turbinolia*), molluscs, otoliths, shark's teeth and nummulites.

Middle Bartonian. PQR 1, 3, 4, P 6 : Respectively gray, brown-gray, gray-green clays with pyrite, gypsum and molluscs.

Upper Bartonian. PQR 5 : gray silty clay with pyrite and molluscs.

Whitecliff bay, Isle of Wight. D 18 : green-gray, silty clay with molluscs and numerous nummulites (*Nummulites variolarius* zone of the Upper Bracklesham beds = Ledian).

NETHERLANDS.

NLD (471). Abandoned clay-pit, 650 m NNE of the station of Schin-op-Geul, province of Limburg. Dark brown-gray clay with *Cerithium* and other brackish water molluscs. Equivalent to the *Cerithium*-clay horizon of Henis in the Tongeren region (*Tg2*).

NLD (669-673). Clay-pit at the top of the Kuiperberg near Ootmarsum, province of Overijsel. Gray clay with septaria, pyrite and molluscs (*Leda deshayesiana*) (*R2c*).

NLD (457-460). Clay-pit « Te Siepe en Schulte » near Winterswijk, province of Gelderland (1 400 m S-720 m W of water-tower of Winterswijk). Gray clay with septaria, pyrite and molluscs (*R2c*).

In the collections of the Geological Institute of Utrecht, some tubes were found that contained Ostracoda derived from the borings Delden and Almelo. For details about these borings, see A. ten Dam, Verh. Geol. Mijnbouwk. Gen., Vol. 14, pp. 137-139, 1945.

Delden : Bartonian. Samples from 70-85 m, 85-90 m, 90-95 m and 96-103 m : Fine- and medium-grained glauconitic sand with nummulites.

Almelo : Bartonian and Ypresian. Sample 158-162 m : light-gray, somewhat sandy clay with nummulites, Bartonian). Sample 169-181 m : light-gray, somewhat glauconitic, and sometimes sandy clay, and clay with nummulites (Ypresian).

FRANCE.

CAB (1000-1002, 1261). Abandoned quarry in the grounds of the Ecole Agriculture at Grignon. Outcrop of yellow and white calcareous, fossiliferous sands, some 7 m high. Lutetian III : 1000, Lutetian IV : 1001, 1002, 1261.

CAG (1249). Sporting field SSW of the church of Mons-en-Pévèle (France). Grayish-green, fine-grained, somewhat clayey sand with few nummulites. Ypresian (*Y1b*).

CAH (1262). Abandoned sand-pit near Cuise-Lamotte. Sample taken 17 m below the mowing field. Yellowish-green, medium-grained sand with mollusc-remains. Upper Ypresian (*Y1c*).

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FAUNA.

In this paper the accounts are given of altogether 160 species and subspecies. For each stratigraphic unit their distribution in the sampes is presented in tables 2 to 16. In the compilation chart (table 1) their ranges are shown through the main lithologic and stratigraphic units.

The quantitative results were gained by counting the number of specimens of each species on a tray of 12 square centimeters by sprinkling this surface with particles of the wash residue. The frequency of the species is expressed as follows : r (rare) = 1-4, C (common) = 5-20, A (abundant) = more than 20 specimens.

A first glance at this chart suggests that many of the species can be used as index fossils, but this would be an overestimation of our data. The following factors should be born in mind. First that the chart is based on our own data alone, because outside Belgium there is but scanty reliable knowledge of the age of our species, especially the Eocene ones. Secondly the range of many of the species is based on very small numbers of individuals. Finally, the great differences between successive associations are partly due to changes of facies from one stratigraphic unit to the other.

YPRESIAN.

The subdivision of this stage into a lower, clayey and upper, sandy part corresponds to Ostracoda associations that are markedly different in number of species. The fauna is fully marine throughout. The lower clays are commonly unfossiliferous. A small number of Ostracoda individuals was met with at only two localities, namely Rumbeke (YC) and Kortemark (RA). The few species involved have also been encountered in higher parts of the Belgian Eocene.

The upper glauconitic sands are richer in Ostracoda, both in species and in individuals. Some 30 species were recognized. The associations are generally dominated by *Krithe rutoti*, *Leguminocythereis striatopunctata* and *Trachyleberis aculeata*, which species are accompanied in many of the samples by *Bythocypris cuisensis*, *Cytherella compressa*, *Echinocythereis scabra*, *Haplocytheridea perforata* and *Pterygocythereis cornuta*. Only two or three species of the fauna may be restricted to the Upper Ypresian, but unfortunately they were but rarely found. *Eucytherura hyonensis* was collected only at Hyon and in corresponding sediments of some borings not dealt with in this paper. *Trachyleberidea prestwichiana*, originally described from the English London clay was observed at Godarville and Maulde. Finally, (?) *Bradleya cornueliana* occurs at Hyon and at Cuise-Lamotte; its occurrence just above the basal gravel of the Lutetian of Godarville may be due to reworking from the underlying Ypresian.

The sandy clays that are found at some places directly on top of the Ieper clay, and which are of questionable stratigraphic position within the Ypresian, appeared to contain Ostracoda at Luingne (KA). This fauna is poor in species, but those present belong to the association of the Upper Ypresian.

Nothing definite can be said about the Paniselian. Only *Leguminocythereis striatopunctata* was found at Teralphene (BG).

Outside the Belgian area, some faunas from the Paris Basin and from a boring in the Netherlands were regarded. In a sample from the lowermost molluscan horizon of Cuise-Lamotte (CAH) (type locality of the Cuisian) a fauna was encountered which is in many aspects similar to that of the Belgian Upper Ypresian. Possibly because of the different facies, other species are dominant in the Cuise-Lamotte association, namely *Bythocypris cuisensis*, *Brachycythere ventricosa* and *Bairdoppilata gliberti* : the latter is unknown from the Belgian Ypresian. Feugueur places the deposits of Cuise stratigraphically directly on top of the Belgian Upper Ypresian. His conclusion is based on the assumption of synchronity of layers with *Nummulites planulatus* throughout Belgium and the Paris Basin. Such correlations based on deposits of very restricted facies cannot be regarded as very strict. In our opinion the Cuisian can coincide in time with the Late Ypresian, regarding the Ostracoda faunas.

In connection with the Paris Basin it is furthermore worth mentioning that the association from the Ypresian of Ménilmontant (Paris) of Bosquet's collection, has far more affinities to the fauna of the Lutetian than to that of the Upper Ypresian.

From the Netherlands we had a sample from the boring Almelo (see ten Dam, 1945). It contains typical Ypresian species such as *Eucytherura hyonensis* and *Krithe rutoti*, mixed up with a Bartonian association with *Schizocythere batjesi*, *Haplocytheridea heinzelini* and *Aulocytheridea punctatella*. The admixture of the latter elements is no doubt due to contamination.

LUTETIAN.

The Bruxellian deposits of Belgium are commonly correlated with the lower part of the Lutetian of the Paris Basin.

The Bruxellian sands again contain a rich Ostracoda fauna of some 40 species, the association of which is distinctly different from that of the underlying Ypresian and from that of the superimposed Upper Eocene. About half of the number of species of the Bruxellian make in this stage their first appearance in our Eocene column. Although most Buxellian species continue into the Belgian Upper Eocene, the association is different from that of the Ledian by the addition of many new species in the latter stage.

No doubt the peculiar facies of the Bruxellian sands is partly responsible for these striking differences. Many of the rather clean, homogeneous sands point to a very shallow environment (current bedding, etc.), while the fauna is always fully marine. Accumulations of such sediments over a fairly vast area may point to deposition on a shallow platform, from which waves and sea currents removed the clayey components. With a few exceptions (Godarville, Nalinnes) most localities only yielded fragile Ostracoda. At Nalinnes the sands are coarse and glauconitic; they contain a rich microfauna, mainly molluscs and bryozoans. Probably Nalinnes was situated not far from the Bruxellian coast line, so that its high contents of calcareous matter may be independent of the general feature that the Bruxellian sands become richer in calcareous fragments towards the top.

On the other hand, the abrupt faunal changes at the base and at the top of the Bruxellian may furthermore be due to time stratigraphic gaps. As long as the stratigraphic position of the Paniselian is not very well understood, a considerable lapse of time is possible between the deposition of the Upper Ypresian sands (Hyon, etc.) and the basal Bruxellian beds. It must be recalled that the Bruxellian often begins with a basal gravel. The beds directly on top of the gravel at Godarville (CO) contain reworked Ypresian Ostracoda, together with a Bruxellian association.

The absence of the higher parts of the Lutetian (II-IV) in Belgium, only known as dubious local remnants and reworked material in the transgressive basal Ledian, furnishes the time stratigraphic gap between Bruxellian and Ledian. The faunal gap is actually bridged by the associations from the Lutetian III and IV of Grignon in the Paris Basin. Good material from this French locality was available, while much further information was to be found in a recent paper by Apostolescu (1955). In facies the sediments of Grignon show a better resemblance to those of the Belgian Ledian than those of the Bruxellian.

The ostracodal fauna of the Bruxellian is characterized by the frequent occurrence, often in large numbers, of *Leguminocythereis genappensis, L. scrobiculata, L. striatopunctata, Hemicytherideis grosjeani, Schizocythere appendiculata, S. tessellata, Paracytheridea gradata,* and *Pterygocythereis cornuta.* After the dominant genera, the fauna may be called a *Leguminocythereis-Schizocythere* association. In our material the following species are restricted to the Bruxellian : *Leguminocythereis genappensis, Paracytheridea brusselensis, Aulocytheridea diegemensis, Brachycythere nalinnesensis* (found only at Nalinnes) and *Paijenborchella longicosta* (also found in the basal Ledian at Forest, probably reworked).

LEDIAN.

The rich Ostracoda fauna of some 60 species of the Belgian Ledian is distinctly different from that of the underlying Lutetian, and differs even from that of the Upper Lutetian of the Paris Basin. The environment was again that of a shallow sea, though somehow different from that of the Bruxellian, as may be inferred from the presence of numerous small nummulites and from the considerable percentage of glauconite in the fine sands.

With the Ledian some 10 species make their appearance in our column. Among them the most frequent are *Aulocytheridea punctatella, Bradleya kaasschieteri* and *Haplocytheridea heinzelini*. On the other hand, a nearly equal number of species end their known stratigraphic range in the Ledian. The most important ones are *Krithe rutoti, Cytheretta crassivenia* and *C. eocaenica*.

Other species found in many samples of the Ledian are *Cuneocythere oblonga, Cytheretta costellata, Bradleya bosquetiana, Pterygocythereis cornuta, Triginglymus angulatopora, Leguminocythereis scrobiculata*, and *L. striatopunctata*. After the dominant genera the Ledian fauna might be called a *Leguminocythereis-Bradleya* association.

When some species with a single occurence are disregarded, none was found to be restricted to our Ledian, though several of them are typical for Ledian and Bartonian together. This is not surprising, considering that the emersion between the Ledian and the Bartonian was not complete in Belgium, and of but short duration. Moreover, the facies of the sands of Lede and that of the (Lower) Bartonian sands of Wemmel is very similar.

The basal Ledian is said to contain often reworked elements from the Lutetian. At Forest (BD 1256 and 1257) we found some Bruxellian species (*Hemicytherideis grosjeani, Paijenborchella longicosta* and *Quadracythere vermiculata*) mixed up with a distinct Ledian assemblage. At the top of the stage the deepest samples from the boring Heist-op-den-Berg (129,50 and 129 m) contain an assemblage, intermediate between the more common associations of the Ledian and Bartonian respectively. Ledian components (*Bythocypris cuisensis, Cytherella pustulosa, Cytheretta eocaenica, C. crassivenia* and *Trachyleberis lichenophora*) are found together with species otherwise only known from the Bartonian (and younger) (*Krithe bartonensis, Eucytherura dentata, Pterygocythereis fimbriata fimbriata, Pterygocythereis tuberosa*). Contamination during the boring may be responsible, though it is equally possible that we are dealing with a real transitional fauna. The coarse-grained sands with numerous nummulites directly below fine Bartonian sands, might indicate continuous sedimentation at this place during the short regression phase of the Ledian.

BARTONIAN.

Because of the subdivision of the Belgian Bartonian into two lithologic units there is no homogeneous Ostracoda assemblage throughout. Several species, present in the sands of Wemmel, are absent from the clay of Asse : *Bairdoppilata gliberti, Bradleya kaasschieteri, Haplocytheridea heinzelini, Leguminocythereis dumonti* and *L. scrobiculata*. Reverse conditions are less clear, possibly because Oedelem is in our collections the only fossiliferous locality from the clay of Asse. Species found at Oedelem, but not in the other parts of the Belgian Bartonian are *Cytheridea intermedia* and *Cytheropteron omaliusi*.

In total some 50 species were found, the majority of which were present already in the earlier Eocene deposits. Very few begin their range in the sands of Wemmel : *Cytheropteron*

gulincki and *Cytheretta concinna.* If the Ledian-Bartonian transitional beds of the boring Heist-op-den-Berg are to be included, also more common species, such as *Krithe bartonensis, Eucytherura dentata* and *Pterygocythereis tuberosa,* would make their appearance after the typical Ledian. The upper limit of the Bartonian marks the end of the range of most Eocene species. Only a few continue into the Oligocene. No doubt this abrupt change is mainly due to considerable facies differences between the fully marine Bartonian sands and clays and the marine and brackish delta deposits of the Tongrian.

A a whole the Belgian Bartonian fauna is characterized by the frequent presence of *Cytherella compressa, Haplocytheridea heizelensis, H. perforata, Krithe bartonensis, Leguminocythereis striatopunctata, Pterygocythereis cornuta, Triginglymus angulatopora, Paijenborchella eocaenica* and *Schizocythere batjesi.* The Bartonian has a *Leguminocythereis-Haplocytheridea* association.

The fauna from the Bartonian of Wight and Barton (type-locality) in the English Hampshire basin, fairly well resembles that from the Belgian Bartonian. Differences in facies between the pyritic clay of Barton and the glauconitic clay of Asse, may be responsible for the fact that at Barton other species are dominant. We are dealing here with a *Leguminocythereis-Cytheretta* association, with *Leguminocythereis striatopunctata, Cytheretta laticosta, Cytheridea intermedia, Haplocytheridea perforata* and *Pterygocythereis fimbriata bartonensis* as the most frequent species.

Some material available from the borings Almelo and Delden (see TEN DAM, 1945, pp. 137-139) shows the presence of the Bartonian in the subsurface of the Netherlands. In the boring Delden a Bartonian association with *Leguminocythereis striatopunctata, Haplocytheridea heizelensis, Cytherella compressa, Krithe bartonensis, Pterygocythereis cornuta, P. tuberosa, Trachyleberidea aranea, Echinocythereis scabra* and *Schizocythere batjesi* was found from 70 m tot 119 m below the surface. Between 158 m and 162 m in the boring Almelo a similar assemblage was met with, while some of these Bartonian species were found mixed up with, Ypresian species at a lower level (169-181 m).

TONGRIAN.

The Ostracoda fauna of the Belgian Tongrian is poor and distinctly different from those of the Eocene. Some 10 species were encountered, only two of which had been found in the underlying stages : *Leguminocythereis striatopunctata* and *Cytherella compressa.* Both these species occur but once in our records. The mainly brackish character of the Tongrian is no doubt for the greater part responsible for these striking differences.

On the other hand most of the Tongrian species were found either as subordinate components of the Belgian Rupelian fauna, or they are known from other, more recent deposits elsewhere.

There is no uniform fauna throughout the Tongrian : the various lithological units of the Tongrian mainly differ from one another in number of Ostracoda.

The marine Lower Tongrian members of Grimmertingen and of Neerrepen only yielded some single individuals. At Grimmertingen (SG) a single valve of *Leguminocythereis striatopunctata* was found, in our records the only Oligocene occurrence of this Eocene species. Moreover, in BOSQUET's collection a few specimens were found of *Leguminocythereis scrobiculata* and *L. striatopunctata* from Grimmertingen and Leten, probably from the same member. A single valve of *Cytheridea pernota* was found in the sands of Neerrepen at Beukenberg-Tongeren (TR).

At Hoogbutsel (LF) a thin clay-bed with brackish to freshwater molluscs contains *Haplocytheridea helvetica.* This layer occurs just below the vertebrate horizon described by GLIBERT and DE HEINZELIN (1952). These two layers together are intercalated in between the Lower Tongrian sands of Neerrepen and the Upper Tongrian sands of Boutersem.

The three Upper Tongrian lithologic units (Boutersem, Henis and Oude-Biezen) contain similar associations, that differ in numbers of species and of individuals. *Haplocytheridea helvetica* occurs throughout. In the sands of Boutersem at Vleminckx-Hoogbutsel (LG) it is the only species. In the Henis clay it is often abundant, occasionally accompanied by *Cytheridea pernota* and *Cyprideis williamsoniana.* In the sands and clays of Oude-Biezen (Vieux-Joncs) *Haplocytheridea helvetica* is mostly abundant but in several samples great numbers of *Cytheridea pernota, Haplocytheridea henisensis, Cyprideis williamsoniana* and *Cytheromorpha zinndorfi* were observed as well. *Haplocytheridea henisensis* is restricted to the Oude-Biezen unit; it does not occur in the Henis clay, as was incorrectly stated in an earlier paper (OERTLI and KEIJ, 1955).

It has to be mentioned in connection with BOSQUET's paper, that the material of this author from Grimmertingen, Leten, Herderen, Kleine-Spouwen, Neerrepen, Tongeren, Borgloon and Oude-Biezen had evidently all been taken from Tongrian deposits.

With the exception of *Cytherella compressa* (a single valve at BZ 545) the assemblages of the Upper Tongrian point to an environment of brackish water. Nodose specimens of *Haplocytheridea helvetica* and *Cyprideis williamsoniana,* which are of frequent occurrence, are generally assumed to be variants induced by low salinity. Recent data from San Antonio bay, Texas (SWAIN, 1955) indicate the occurrence of species of *Cytheromorpha* and *Cyprideis* in all environments of the bay, these species evidently have a wide salinity tolerance. KRUIT (1955) also found *Cytheromorpha* most abundantly in the coastal lakes of the upper delta area of the Rhone river. ELOFSON (1941) reported that the Scandinavian species of *Cytheromorpha,* he found, is also a brackish water inhabitant. Furthermore *Cytherissa spathacea* is a remarkable species. It is known from the Upper Oligocene *Cyrena* marls of the Mayence Basin (LIENENKLAUS, 1905). However, in Quaternary deposits and living, the genus is restricted to a freshwater-lake environment. As a result there is some reason to assume that the Upper Tongrian deposits were laid down in various habitats near shore, where considerable salinity fluctuations were caused by periodical inflow of large quantaties of fresh water from the hinterland.

The brackish water character of the molluscan fauna from the Upper Tongrian at Tongeren, had already been pointed out, among others by GLIBERT (1954).

RUPELIAN.

The Rupelian Ostracoda fauna as a whole is richer than that of the Tongrian. Some 30 species were encountered, five of which cross the Tongrian-Rupelian boundary, another five of them had already been found in our Eocene deposits. As a consequence the majority appear for the first time in our column.

The three main lithologic units of the Belgian Rupelian. (Berg sand, *Nucula* clay and Boom clay) have very different Ostracoda faunas.

The lowermost member, the sands of Berg, which occur in the region of Tongeren, contain a very poor association. All its components recur in the overlying *Nucula* clay of the same area.

The *Nucula* clay is richest in number of species and especially in number of individuals. The most common species are *Cytheridea pernota, Haplocytheridea curvata* and *Paracyprideis*

rarefistulosa. The latter two were not found in the Boom clay. The following species of the *Nucula* clay, present in several samples, do not recur in the higher Rupelian unit either : *Cuneocythere lienenklausi, Cytheretta concinna, Cyprideis williamsoniana, Haplocytheridea punctatella, Hermanites hebertiana* and *Loxoconcha nystiana*. The fauna shows affinities to both the Lower Meeressand and the Rupelton of the Mayence basin (LIENENKLAUS, 1905). The fauna of 23 species contains 10 species of the Cytherideinae and 3 of the Loxoconchinae. In the recent seas both subfamilies include, beside marine species, many others that can endure brackish water conditions. As a consequence it is considered likely that the *Nucula comta* clay was deposited in an open bay where occasional salinity decrease did occur.

The uppermost, and also the main unit of the Belgian Rupelian, the Boom clay, has the widest distribution. Not only does it extend in Belgium far beyond the area of the two lower members, but it also continues into the Netherlands and into Germany to the region of Berlin. In this layered, pyritic clay with septaria some twenty species were found, but always in small numbers only. The largest number of species occurring in one sample was five (Steendorp, JJ 621). The individuals are well preserved, always adult and mostly with pyrite filling. The commonest are *Cytherella compressa* and *Trachyleberis asperrima echinata*, less frequent are *Cytherella beyrichi, Haplocytheridea helvetica, Krithe pernoides, Pterygocythereis fimbriata* and *Trachyleberidea hollandica*. Some of these species were also found in the Dutch Rupelian at Winterswijk and Ootmarsum.

Some samples of the German equivalent, the Septarienton, were available through the kindness of Dr. H. HILTERMANN (Hannover). At Pietzpuhl we found *Krithe pernoides, Trachyleberis asperrima echinata* and *Cytheropteron tricorne* (BORNEMANN), and at Hermsdorf *Krithe pernoides, Echinocythereis scabra, Trachyleberidea asperrima echinata* and (?) *Buntonia varians* (BORNEMANN).

Summarizing our data on the Belgian Eo-Oligocene Ostracods it is apparent that the total faunas of both Older Tertiary formations in this country are distinctly different from one another. As a whole the Eocene is much richer in number of species, most of which did not recur in the Oligocene. Apart from evolutionary changes of the faunas, facies differences were evidently of decisive importance. During most of the Eocene time shallow, open sea environments prevailed, whereas more specialized habitats predominated in the Oligocene.

Notwithstanding facies changes, *Leguminocythereis* was the commonest genus throughout the Eocene. Its representatives occur in the greater part of our samples, often in considerable numbers. *Leguminocythereis striatopunctata* is always the commonest species of the genus.

When we characterize the whole fauna of a stage or other unit by the two most common genera, we get successively the *Leguminocythereis-Krithe* association of the Upper Ypresian, the *Leguminocythereis-Schizocythere* association of the Bruxellian, the *Leguminocythereis-Bradleya* association of the Ledian and the *Leguminocythereis-Haplocytheridea* association of the Bartonian. The Bartonian clay of Barton has a *Leguminocythereis-Cytheretta* association; the Bartonian of the boring Delden a *Leguminocythereis-Krithe* or*Haplocytheridea* association. The data about the French Eocene strata are too scarce to be thus characterized.

The following genera and subgenera are as yet typical for the Eocene : *Aulocytheridea* HOWE (United States, Belgium, France, Netherlands) *Monsmirabilia* APOSTOLESCU (Belgium, France, England, Netherlands), *Hirsutocythere* HOWE (United States, Belgium, France) and *Triginglymus* BLAKE (United States, Belgium, France, Netherlands).

The Oligocene deposits with numerous Ostracoda are always of more or less brackish water environments. The number of species is restricted; the genus *Haplocytheridea* is dominant.

TABLE 1.

	Ypresian		Lutetian		Le-dian	Bartonian			Tongrian		Rupelian		
	Lower	Upper	Zone 1	Zone 2-4					Lower	Upper			
	Ieper Clay	Glauconitic sands	Calcareous sands	Calc., zoög. sands, France	Glauconitic sands	Glauconitic sands of Wemmel	Glauconitic clay of Asse	Pyritic clay of Barton, England	Marine sands	Brackish sands and clays	Sands of Berg and Nucula clay	Pyritic clay of Boom	Stampian, Paris Basin
Aulocytheridea faboides													
Cytheridea intermedia													
Cytherura bambruggensis													
Haplocytheridea perforata													
Leguminocythereis striatopunctata													
Pterygocythereis cornuta													
Trachyleberis (T.) aculeata													
Bairdoppilata gliberti													
Brachycythere ventricosa													
Bradleya approximata													
(?) *Bradleya cornueliana*													
Bythocypris cuisensis													
Cuneocythere (M.) subovata													
Cuneocythere (M.) oblonga													
Cuneocythere (M.) triebeli													
Cytherella compressa													
Cytherelloidea hieroglyphica													
Cytheretta decipiens													
Cytheretta eocaenica													
Cytheretta haimeana													
Cytherura forestensis													
Echinocythereis scabra													
Eucytherura hyonensis													
Haplocytheridea hebertiana													
Hemicytherideis grosjeani													

	Ypresian		Lutetian		Le-dian	Bartonian			Tongrian		Rupelian			
	Lower	Upper	Zone 1	Zone 2-4					Lower	Upper				
	Ieper Clay	Glauconitic sands	Calcareous sands	Calc., zoög. sands, France	Glauconitic sands	Glauconitic sands of Wemmel	Glauconitic clay of Asse	Pyritic clay of Barton, England	Marine sands	Brackish sands and clays	Sands of Berg and Nucula clay	Pyritic clay of Boom	Stampian, Paris Basin
Hemicytherideis mayeri														
Hermanites paijenborchiana														
Hirsutocythere horrescens														
Kingmaina forbesiana														
Krithe rutoti														
Loxoconcha subovata														
Paracytheridea gradata														
Paijenborchella lomata														
Platella gyrosa														
Pterygocythere hilli														
Pterygocythereis fimbr. spinigera														
Schizocythere appendiculata														
Schizocythere tessellata														
Trachyleberidea aranea														
Trachyleberidea prestwichiana														
Triginglymus angulatopora														
Aulocytheridea diegemensis														
Aulocytheridea mourloni														
Boldella deldenensis														
Brachycythere nalinnesensis														
Cytherella münsteri														
Cytherelloidea dameriacensis														
Cytheretta bambruggensis														
Cytheretta costellata														
Cytheropteron (E.) omaliusi														
Cytherura oedelemensis														

	Ypresian		Lutetian		Le-dian	Bartonian			Tongrian		Rupelian		
	Ieper clay	Glauconitic sands	Calcareous sands	Calc., zoög. sands, France	Glauconitic sands	Glauconitic sands of Wemmel	Glauconitic clay of Asse	Pyritic clay of Barton, England	Marine sands	Brackish sands and clays	Sands of Berg and Nucula clay	Pyritic clay of Boom	Stampian, Paris Basin
	Lower	Upper	Zone 1	Zone 2-4					Lower	Upper			
Eucythere triordinis	—	—	—	—			—						
Leguminocythereis genappensis	—												
Leguminocythereis scrobiculata	—	—	—	—	—	—			- - -		—	—	—
Paracytheridea brusselensis	—												
Paracypris contracta	—	—	—	—	—	—	—	—					
Paijenborchella longicosta	—				- - -								
Quadracythere vermiculata	—	—	—		—								
Trachyleberis (T.) lichenophora	—	—	—	—	—	- - -							
Aglaiocypris enigmatica			—										
Bradleya bosquetiana			—	—	—	—							
Caudites monsmirabiliensis			—										
Clithrocytheridea appendiculata			—										
Clithrocytheridea fornicata			—										
Clithrocytheridea lerichei			—										
Clithrocytheridea verrucosa			—										
Cuneocythere (M.) foveolata			—	—	—	—	—						
Cyprideis (G.) apostolescui			—										
Cypridina homoedwardsiana			—	—									
Cytherella pustulosa			—	—	—	- - -							
Cytheretta crassivenia			—	—	—	- - -							
(?) *Leguminocythereis multicostata*			—										
Leguminocythereis pertusa			—	—									
Microxestoleberis parnensis			—										
Paracytheridea grignonensis			—										
Quadracythere angusticostata			—	—									
Quadracythere lamarckiana			—										

	Ypresian		Lutetian		Le-dian	Bartonian			Tongrian		Rupelian		
	Lower	Upper	Zone 1	Zone 2-4					Lower	Upper			
	Ieper clay	Glauconitic sands	Calcareous sands	Calc., zoög. sands, France	Glauconitic sands	Glauconitic sands of Wemmel	Glauconitic clay of Asse	Pyritic clay of Barton, England	Marine sands	Brackish sands and clays	Sands of Berg and Nucula clay	Pyritic clay of Boom	Stampian, Paris Basin
Triginglymus grignonensis													
Triginglymus heistensis													
Triginglymus neauphlensis													
Triginglymus tenuistriatus													
Xestoleberis subglobosa													
Aulocytheridea punctatella													
Aulocytheridea tavernieri													
Bradleya kaasschieteri													
Cytheromorpha brabantica													
Haplocytheridea heinzelini													
Haplocytheridea heizelensis													
Leguminocythereis dumonti													
Paijenborchella eocaenica													
Pseudocythere sp.													
Quadracythere orbignyana													
Schizocythere batjesi													
Eucytherura dentata													
Krithe bartonensis													
Pterygocythereis fimbr. fimbriata													
Pterygocythereis tuberosa													
Cytheropteron aff. *fiski*													
Cytheropteron (C.) gulincki													
Cytheretta concinna													
Cytheretta gracilicosta													

	Ypresian		Lutetian		Le-dian	Bartonian			Tongrian		Rupelian		
	Lower	Upper	Zone 1	Zone 2-4					Lower	Upper			
	Ieper clay	Glauconitic sands	Calcareous sands	Calc., zoög. sands, Fr	Glauconitic sands	Glauconitic sands of	Glauconitic clay of A	Pyritic clay of Barto	Marine sands	Brackish sands and c	Sands of Berg and N	Pyritic clay of Boom	Stampian, Paris Basi
Cytheretta laticosta							—	—					
Pterygocythereis fimbr. bartonensis								—					
Cytheridea pernota									—	—	—		—
Cyprideis (G.) williamsoniana										—	—		
Cytheridea praesulcata										—	—		
Cytherissa spathacea										—			
Cytheromorpha zinndorfi										—			
Haplocytheridea helvetica										—	—	—	—
Haplocytheridea henisensis										—			
Cytheretta tenuipunctata									—	—	—		—
Cuneocythere (C.) lienenklausi											—		
Cuneocythere (C.) marginata											—	—	
Cytherella beyrichi											—	—	
Cytherura gracilis											—		
Echinocythereis hispida											—		—
Haplocytheridea curvata											—		
Haplocytheridea punctatella.											—		—
Hemicytherideis lithodomoides											—		—
Hermanites hebertiana											—		—
Loxoconcha kuiperi											—		
Loxoconcha nystiana											—		
Loxoconcha subtriangularis											—		
Paracyprideis rarefistulosa											—		

	Ypresian		Lutetian		Bartonian			Lo-dian	Tongrian		Rupelian		
	Lower	Upper	Zone 1	Zone 2-4					Lower	Upper			
	Ieper clay	Glauconitic sands	Calcareous sands	Calc., zoög. sands, Fresnes, France	Glauconitic sands	Glauconitic sands of Wemmel	Glauconitic clay of Asse	Pyritic clay of Barton, England	Marine sands	Brackish sands and clays	Sands of Berg and Nucula clay	Pyritic clay of Boom	Stampian, Paris Basin
Cytherella transversa													
Cytheropteron steinmanni													
Krithe pernoides													
Paijenborchella cf. *tricostata*													
Trachyleberidea hollandica													
Trachyleberis (T.) asperrima echinata													
Trachyleberis (T.) spinosa													
Xestoleberis muelleriana													
Argilloecia jeurrensis													
Cytherella jonesiana													
Pokornyella limbata													
Quadracythere macropora													

THE COLLECTION BOSQUET.

Through the courtesy of Dr. M. GLIBERT the classic collection of BOSQUET's Tertiary Ostracoda (1852) could be re-studied. The collection is deposited in the Royal Institute for Natural Sciences of Belgium in Brussels.

The Ostracoda were stored in glass tubes. Part of the collection is in a bad state of preservation, the specimens being so friable that handling them was a precareous task. Some of the tubes were empty; the ostracods had probably fallen to dust in the course of time. The remaining specimens were transferred to slides, to make them more accessable for re-study and to separate the mixed material of several species in one tube.

From the following new species of BOSQUET no material was left over : *Bairdia foveolata, Bairdia punctatella, Cythere inornata, Cythere pusilla, Cythere monilifera* and *Cythere dumontiana.*

The originals of *Cythere haimeana* BOSQUET were also absent, but out of our material from Grignon a neotype of this species could be chosen. For all the remaining species, described as new by BOSQUET, and recognized by the writer as valid species, lectotypes could be designated.

Designation of type-localities was often difficult. BOSQUET had generally mixed up material from several localities. Prof. Dr. R. RICHTER (Frankfurt) advised (written communication) to chose a *locus typicus restrictus* out of BOSQUET's localities, if it could be ascertained from new material that the species does occur at that place. For this purpose material was available from Cuise-Lamotte, from Grignon and from several of BOSQUET's localities in the Belgian Oligocene, and from the Miocene of the Aquitaine Basin. It enabled the designation of a locus typicus restrictus for several of BOSQUET's species. For others this remains to be done however, since topotype specimens were lacking in our material.

The collections of the Geological Institute of Utrecht contain a small number of specimens of BOSQUET's species. They are a donation (1883) from the late Mr. A. W. G. VAN RIEMSDIJK. The specimens were derived from localities mentioned in BOSQUET's monograph. From the literature it is known, that BOSQUET was acquainted to VAN RIEMSDIJK, so we think this small collection was presented by BOSQUET to VAN RIEMSDIJK.

COLLECTION BOSQUET.

No.	Original determination.	New determination.
1.	*Cytherella compressa* (VON MÜNSTER) ...	= *Cytherella compressa* (VON MÜNSTER).
a)	—	= material lost.
b)	—	= *Cytherella compressa* (VON MÜNSTER), *Cytherella beyrichi* (REUSS), *Cyprideis* (*Goerlichia*) *williamsoniana* (BOSQUET).
2.	*Cytherella münsteri* (ROEMER)	= *Cytherella münsteri* (ROEMER).
b)	—	= *Cytherella münsteri* (ROEMER), *Cytherella pustulosa* n. sp.
c)	—	= *Cytherella* sp., *Hemicytherideis grosjeani* n. sp.
3.	*Cytherella hieroglyphica* BOSQUET	= *Cytherelloidea hieroglyphica* (BOSQUET), *Cytherelloidea dameriacensis* APOSTOLESCU.
b)	—	= material lost.
c)	—	= *Cytherelloidea hieroglyphica* (BOSQUET).
4.	*Cytherella jonesiana* BOSQUET	= *Cytherella jonesiana* BOSQUET.
5.	*Bairdia foveolata* BOSQUET	= material lost.
6.	*Bairdia subradiosa* (ROEMER)	= *Cuneocythere* (*Monsmirabilia*) *oblonga* APOSTOLESCU, *Cuneocythere* (*Monsmirabilia*) *foveolata* (BOSQUET).
7.	*Bairdia subglobosa* BOSQUET	= *Xestoleberis subglobosa* (BOSQUET).
b)	—	= *Xestoleberis subglobosa* (BOSQUET), *Cuneocythere* (*Monsmirabilia*) *foveolata* (BOSQUET).
8.	*Bairdia perforata* (ROEMER)	= material lost.
b)	—	= *Cytherella münsteri* (ROEMER), *Cuneocythere* (*Monsmirabilia*) *oblonga* APOSTOLESCU, *Cuneocythere* (*Monsmirabilia*) *foveolata* (BOSQUET), *Cuneocythere* (*Monsmirabilia*) *subovata* APOSTOLESCU.

No.	Original determination.	New determination.
9.	*Bairdia strigulosa* (REUSS)	= *Haplocytheridea strigulosa* (REUSS).
10.	*Bairdia punctatella* BOSQUET	= material lost.
	b) —	= material lost.
11.	*Bairdia hebertiana* BOSQUET	= *Haplocytheridea hebertiana* (BOSQUET).
12.	*Bairdia marginata* BOSQUET	= *Cuneocythere* (*Cuneocythere*) *marginata* (BOSQUET), *Cuneocythere* (*Cuneocythere*) *lienenklausi* n. sp.
13.	*Bairdia subdeltoidea* (VON MÜNSTER) ...	= material lost.
	b) —	= material lost.
	c) —	= *Bairdoppilata gliberti* n. sp.
	d) —	= *Bairdoppilata gliberti* n. sp.
	e) —	= *Bairdoppilata gliberti* n. sp.
14.	*Bairdia arcuata* (VON MÜNSTER)	= *Bythocypris arcuata* (VON MÜNSTER).
	b) —	= *Argilloecia jeurrensis* n. sp.
	c) —	= *Bythocypris cuisensis* n. sp., *Aglaiocypris enigmatica* n. sp.
	d) —	= *Bythocypris cuisensis* n. sp.
	e) —	= *Bythocypris cuisensis* n. sp.
15.	*Bairdia linearis* (ROEMER)	= *Neocytherideis linearis* (ROEMER).
16.	*Bairdia curvata* BOSQUET	= *Hemicytherideis curvata* (BOSQUET).
	b) —	= material lost.
17.	*Bairdia lithodomoides* BOSQUET	= material lost.
	b) —	= *Hemicytherideis lithodomoides* (BOSQUET).
	c) —	= *Hemicytherideis lithodomoides* (BOSQUET).
	d) —	= material lost.
18.	*Cytheridea mulleri* (VON MÜNSTER)	= *Cytheridea* sp.
	b) —	= *Cytheridea pernota* OERTLI and KEIJ, *Haplocytheridea helvetica* (LIENENKLAUS).
	c) —	= *Haplocytheridea helvetica* (LIENENKLAUS), *Cytheridea pernota* OERTLI and KEIJ, *Paracyprideis rarefistulosa* (LIENENKLAUS).
	d) —	= *Haplocytheridea helvetica* (LIENENKLAUS), *Haplocytheridea henisensis* KEIJ, *Cytheridea pernota* OERTLI and KEIJ.
	e) —	= *Haplocytheridea* sp., *Clithrocytheridea appendiculata* APOSTOLESCU.
19.	*Cytheridea papillosa* BOSQUET	= *Krithe papillosa* (BOSQUET).
	b) —	= *Krithe rutoti* n. sp., *Clithrocytheridea lerichei* n. sp.
	c) —	= *Krithe rutoti* n. sp.
20.	*Cytheridea williamsoniana* BOSQUET ...	= *Cyprideis* (*Goerlichia*) *williamsoniana* (BOSQUET).
	b) —	= *Cyprideis* (*Goerlichia*) *apostolescui* n. sp.
21.	*Cytheridea incrassata* BOSQUET	= *Haplocytheridea perforata* (ROEMER).
	b) —	= *Haplocytheridea perforata* (ROEMER).

No.	Original determination.	New determination.
22.	*Cypris faba* DESMAREST	= not investigated.
23.	*Cythere faboides* BOSQUET	= *Aulocytheridea faboides* (BOSQUET).
	b) —	= *Aulocytheridea faboides* (BOSQUET).
24.	*Cythere jurinei* (VON MÜNSTER)	= *Cytheretta jurinei* (VON MÜNSTER), *Cytheretta rhenana rhenana* TRIEBEL, *Cytheretta ramosa sublaevis* TRIEBEL.
	b) —	= *Cytheretta tenuipunctata* (BOSQUET).
	c) —	= *Cytheretta tenuipunctata* (BOSQUET).
	d) —	= *Cytheretta eocaenica* n. sp.
	e) —	= *Cytheretta eocaenica* n. sp.
25.	*Cythere costellata* (ROEMER)	= *Cytheretta costellata* (ROEMER), *Cytheretta crassivenia* APOSTOLESCU, *Cytheretta* sp., *Leguminocythereis dumonti* n. sp.
	b) —	= material lost.
	c) —	= *Cytheretta haimeana* (BOSQUET).
26.	*Cythere multicostata* BOSQUET	= material lost.
	b) —	= (?) *Leguminocythereis multicostata* (BOSQUET).
27.	*Cythere plicata* VON MÜNSTER	= material lost.
	b) —	= *Cytheretta concinna* TRIEBEL.
	c) —	= *Cytheretta concinna* TRIEBEL.
28.	*Cythere haimeana* BOSQUET	= material lost.
29.	*Cythere striatopunctata* (ROEMER)	= *Leguminocythereis striatopunctata* (ROEMER).
	b) —	= *Leguminocythereis striatopunctata* (ROEMER), *Leguminocythereis scrobiculata* (VON MÜNSTER), *Leguminocythereis pertusa* (ROEMER), *Cytheretta costellata* (ROEMER), *Triginglymus angulatopora* (REUSS), *Triginglymus heistensis* n. sp.
	c) —	= *Leguminocythereis striatopunctata* (ROEMER), *Leguminocythereis pertusa* (ROEMER), *Leguminocythereis scrobiculata* (VON MÜNSTER), *Cytheretta crassivenia* APOSTOLESCU.
	d) —	= *Leguminocythereis scrobiculata* (VON MÜNSTER).
	e) —	= *Leguminocythereis striatopunctata* (ROEMER).
30.	*Cythere scrobiculata* (VON MÜNSTER) ...	= *Leguminocythereis scrobiculata* (VON MÜNSTER).
	b) —	= *Leguminocythereis scrobiculata* (VON MÜNSTER).
	c) —	= *Leguminocythereis scrobiculata* (VON MÜNSTER).
31.	*Cythere nystiana* BOSQUET	= *Loxoconcha nystiana* (BOSQUET), *Loxoconcha subtriangularis* (SPEYER), *Loxoconcha kuiperi* n. sp.
	b) —	= (?) *Echinocythereis hispida* (SPEYER).

No.	Original determination.	New determination.
32.	*Cythere jonesiana* BOSQUET	= *Triginglymus angulatopora* (REUSS).
	b) —	= *Triginglymus angulatopora* (REUSS), *Triginglymus heistensis* n. sp., *Triginglymus grignonensis* APOSTOLESCU, *Triginglymus tenuistriatus* APOSTOLESCU.
33.	*Cythere angulatopora* (REUSS)	= *Bradleya bosquetiana* (JONES and SHERBORN).
	b) —	= *Bradleya bosquetiana* (JONES and SHERBORN).
34.	*Cythere favosa* (ROEMER)	= *Urocythereis favosa* (ROEMER), *Aurila* sp., *Echinocythereis scabra* (VON MÜNSTER).
35.	*Cythere inornata* BOSQUET	= material lost.
36.	*Cythere lamarckiana* BOSQUET	= *Quadracythere lamarckiana* (BOSQUET).
	b) —	= material lost.
37.	*Cythere bidentata* BOSQUET	= (?) *Urocythereis bidentata* (BOSQUET).
38.	*Cythere punctatula* (ROEMER)	= material lost.
	b) —	= material lost.
39.	*Cythere punctatella* (REUSS)	= *Loxoconcha punctatella* (REUSS), *Xestoleberis* sp.
40.	*Cythere cicatricosa* (REUSS)	= *Aurila cicatricosa* (REUSS), *Aurila punctata* (VON MÜNSTER).
41.	*Cythere galeata* (REUSS)	= material lost.
42.	*Cythere limbata* BOSQUET	= *Pokornyella limbata* (BOSQUET).
	b) —	= material lost.
43.	*Cythere ventricosa* BOSQUET	= *Brachycythere ventricosa* (BOSQUET).
	b) —	= *Brachycythere ventricosa* (BOSQUET).
44.	*Cythere grateloupiana* BOSQUET	= *Loxoconcha grateloupiana* (BOSQUET).
45.	*Cythere deformis* (REUSS)	= material lost.
46.	*Cythere sagittula* (REUSS)	= material lost.
47.	*Cythere tessellata* BOSQUET	= *Schizocythere tessellata* (BOSQUET).
	b) —	= *Schizocythere tessellata* (BOSQUET).
	c) —	= *Schizocythere tessellata* (BOSQUET), *Schizocythere appendiculata* TRIEBEL.
	d) —	= *Schizocythere tessellata* (BOSQUET).
48.	*Cythere pusilla* BOSQUET	= material lost.
49.	*Cythere orbignyana* BOSQUET	= *Quadracythere orbignyana* (BOSQUET).
50.	*Cythere approximata* BOSQUET	= *Bradleya approximata* (BOSQUET), *Trachyleberis* (*Trachyleberis*) *aculeata* (BOSQUET), *Quadracythere angusticostata* (BOSQUET).
51.	*Cythere cornueliana* BOSQUET	= *Bradleya cornueliana* (BOSQUET).
52.	*Cythere vermiculata* BOSQUET	= *Quadracythere vermiculata* (BOSQUET).

No.	Original determination.	New determination.
53.	*Cythere angusticostata* BOSQUET	= *Quadracythere angusticostata* (BOSQUET).
54.	*Cythere plicatula* (REUSS)	= *Falunia plicatula* (REUSS).
55.	*Cythere edwardsi* (ROEMER)	= *Trachyleberis* (*Costa*) *edwardsi* (ROEMER).
	b) —	= material lost.
	c) —	= *Trachyleberis* (*Costa*) *edwardsi* (ROEMER), *Carinocythereis carinata* (ROEMER).
56.	*Cythere hebertiana* BOSQUET	= *Hermanites hebertiana* (BOSQUET), *Quadracythere macropora* (BOSQUET).
57.	*Cythere macropora* BOSQUET	= *Quadracythere macropora* (BOSQUET).
	b) —	= *Quadracythere angusticostata* (BOSQUET).
58.	*Cythere thierensiana* BOSQUET	= *Quadracythere angusticostata* (BOSQUET), *Hirsutocythere horrescens* (BOSQUET).
	b) —	= material lost.
59.	*Cythere arachnoidea* BOSQUET	= *Trachyleberis* (*Trachyleberis*) *aculeata* (BOSQUET).
60.	*Cythere truncata* (REUSS)	= *Schizocythere* sp.
61.	*Cythere lyelliana* BOSQUET	= *Trachyleberis* (*Trachyleberis*) *asperrima echinata* (REUSS) *Cytheretta costellata* (ROEMER).
62.	*Cythere scabra* VON MÜNSTER	= *Echinocythereis scabra* (VON MÜNSTER).
63.	*Cythere nebulosa* BOSQUET	= *Hirsutocythere horrescens* (BOSQUET).
64.	*Cythere monilifera* BOSQUET	= material lost.
65.	*Cythere aculeata* BOSQUET	= *Trachyleberis* (*Trachyleberis*) *aculeata* (BOSQUET).
	b) —	= *Trachyleberis* (*Trachyleberis*) *aculeata* (BOSQUET).
66.	*Cythere formosa* BOSQUET	= *Trachyleberis* (*Trachyleberis*) *lichenophora* (BOSQUET).
67.	*Cythere reussiana* BOSQUET	= *Hermanites hebertiana* (BOSQUET).
68.	*Cythere micheliniana* BOSQUET	= *Ruggieria micheliniana* (BOSQUET).
69.	*Cythere francqana* BOSQUET	= *Pterygocythereis fimbriata* (VON MÜNSTER).
70.	*Cythere pectinata* BOSQUET	= *Bosquetina pectinata* (BOSQUET), *Ruggieria* sp.
71.	*Cythere ceratoptera* BOSQUET	= *Pterygocythereis fimbriata fimbriata* (VON MÜNSTER).
	b) —	= *Pterygocythereis fimbriata fimbriata* (VON MÜNSTER).
	c) —	= *Pterygocythereis fimbriata fimbriata* (VON MÜNSTER).
72.	*Cythere calcarata* BOSQUET	= *Pterygocythereis* sp.
73.	*Cythere cornuta* (ROEMER)	= material lost.
	b) —	= *Pterygocythereis cornuta* (ROEMER).
74.	*Cythere horrescens* BOSQUET	= *Hirsutocythere horrescens* (BOSQUET).
	b) —	= *Hirsutocythere horrescens* (BOSQUET).
75.	*Cythere dumontiana* BOSQUET	= material lost.
76.	*Cythere deshayesiana* BOSQUET	= *Quadracythere angusticostata* (BOSQUET).

No.	Original determination.		New determination.
77.	*Cythere lichenophora* BOSQUET	=	*Trachyleberis* (*Trachyleberis*) *lichenophora* (BOSQUET), *Trachyleberis* (*Trachyleberis*) *aculeata* (BOSQUET), *Quadracythere angusticostata* (BOSQUET).
78.	*Cythere pygmaea* (REUSS)	=	material lost.
79.	*Cythere haidingeri* (REUSS)	=	*Triginglymus angulatopora* (REUSS).
	b) —	=	*Quadracythere vermiculata* (BOSQUET).
	c) —	=	*Hermanites paijenborchiana* n. sp., *Bradleya approximata* (BOSQUET).
	d) —	=	*Hermanites paijenborchiana* n. sp.
80.	*Cythere gradata* BOSQUET	=	*Paracytheridea* (*Paracytheridea*) sp.
	b) —	=	*Paracytheridea* (*Paracytheridea*) sp., *Kingmaina forbesiana* (BOSQUET).
	c) —	=	material lost.
	d) —	=	*Paracytheridea* (*Paracytheridea*) *gradata* (BOSQUET).
81.	*Cythere fenestrata* BOSQUET	=	*Paracytheridea* (*Paracytheropteron*) *fenestrata* (BOSQUET).
82.	*Cythere forbesiana* BOSQUET	=	*Kingmaina forbesiana* (BOSQUET).
	b) —	=	*Kingmaina forbesiana* (BOSQUET), *Hirsutocythere horrescens* (BOSQUET), *Pterygocythereis cornuta* (ROEMER).
83.	*Cyprella edwardsiana* BOSQUET	=	*Cypridina homoedwardsiana* (BOSQUET).
	b) —	=	*Cypridina homoedwardsiana* (BOSQUET).

COLLECTION VAN RIEMSDIJK.

(Granted to the collections of the Geological Institute of Utrecht in 1883.)

No.	Original determination.		New determination.	Locality.
S 93	*Cytherella compressa* (VON MÜNSTER).	=	*Cytherella compressa* (VON MÜNSTER)...	Berg.
S 94	*Cytherella münsteri* (ROEMER)	=	*Cytherella münsteri* (ROEMER)	Chaumont.
S 95	*Bairdia subradiosa* (ROEMER)	=	*Cuneocythere* (*Monsmirabilia*) *oblonga* APOSTOLESCU	Parnes.
S 96	*Bairdia subglobosa* BOSQUET	=	*Xestoleberis subglobosa* (BOSQUET) ...	Courtagnon.
S 97	*Bairdia strigulosa* (REUSS)	=	*Haplocytheridea strigulosa* (REUSS) ...	Dax.
S 98	*Bairdia punctatella* BOSQUET	=	*Cuneocythere* (*Cuneocythere*) *lienenklausi* n. sp.	Jeurre.
S 99	*Bairdia marginata* BOSQUET	=	*Cuneocythere* (*Cuneocythere*) *marginata* (BOSQUET)	Berg.
S 100	*Bairdia subdeltoidea* (VON MÜNSTER) ..	=	*Bairdia subdeltoidea* (VON MÜNSTER) ...	Mérignac.
S 101	*Bairdia arcuata* (VON MÜNSTER)	=	*Bythocypris arcuata* (VON MÜNSTER) ...	Léognan.
S 102	*Cytheridea mülleri* (VON MÜNSTER) ...	=	*Haplocytheridea helvetica* (LIENENKLAUS)	Oude-Biezen.
S 103	*Cytheridea papillosa* BOSQUET	=	*Krithe papillosa* (BOSQUET)	Mérignac.
S 104	*Cytheridea williamsoniana* BOSQUET ..	=	*Cyprideis* (*Goerlichia*) *williamsoniana* (BOSQUET)	Berg.

No.	Original determination.		New determination.	Locality.
S 105	*Cythere incrassata* BOSQUET	=	*Cuneocythere* (*Monsmirabilia*) *subovata* APOSTOLESCU	Pisseloup.
S 106	*Cythere jurinei* VON MÜNSTER	=	*Cytheretta tenuipunctata* (BOSQUET) ...	Léognan.
S 107	*Cythere costellata* (ROEMER)	=	*Cytheretta costellata* (ROEMER)	Nanteuil.
S 108	*Cythere plicata* VON MÜNSTER	=	*Cytheretta* sp. (juv. ex.)	Berg.
S 109	*Cythere striatopunctata* (ROEMER) ...	=	*Leguminocythereis striatopunctata* (ROEMER)	Hermonville.
S 110	*Cythere nystiana* BOSQUET	=	*Loxoconcha nystiana* (BOSQUET)	Berg.
S 111	*Cythere jonesiana* BOSQUET	=	*Triginglymus grignonensis* APOSTOLESCU, *Triginglymus angulatopora* (REUSS) ...	Montmirail.
S 112	*Cythere angulatopora* (REUSS)	=	*Bradleya bosquetiana* (JONES and SHERBORN)	Daméry.
S 113	*Cythere favosa* (ROEMER)	=	*Urocythereis favosa* (ROEMER)	Perpignan.
S 114	*Cythere punctatella* (REUSS)	=	*Loxoconcha punctatella* (REUSS)	Perpignan.
S 115	*Cythere cicatricosa* (REUSS)	=	*Aurila cicatricosa* (REUSS)	—
S 116	*Cythere limbata* BOSQUET	=	*Haplocytheridea helvetica* (LIENENKLAUS)	Etréchy.
S 117	*Cythere ventricosa* BOSQUET	=	*Brachycythere ventricosa* (BOSQUET) ...	Férine-de-l'Arme.
S 118	*Cythere grateloupiana* BOSQUET	=	*Loxoconcha grateloupiana* (BOSQUET) ...	Mérignac.
S 119	*Cythere tessellata* BOSQUET	=	*Schizocythere tessellata* (BOSQUET) ...	Chambord.
S 120	*Cythere hebertiana* BOSQUET	=	*Hermanites hebertiana* (BOSQUET)	Jeurre.
S 121	*Cythere ceratoptera* BOSQUET	=	*Pterygocythereis fimbriata fimbriata* (VON MÜNSTER)	Berg.
S 122	*Cythere cornuta* (ROEMER)	=	*Pterygocythereis cornuta* (ROEMER) ...	Houdan.

TABLE 2. — **Upper Ypresian (CUISIAN) of the Paris Basin (coll. BOSQUET).**

	Cuise-Lamotte	Epernay	Ménilmontant (Paris)	Soissons
Bairdoppilata gliberti	?	?	?	?
Brachycythere ventricosa	+	.	.	.
(?) *Bradleya cornuelinana*	+	.	.	.
Bythocypris cuisensis	+	.	.	.
Cytherella sp.	.	.	+	.
Cytherelloidea hieroglyphica	.	.	+	.
Cytheretta eocaenica	.	.	+	.
Cytheretta haimeana	.	.	+	.
Hemicytherideis grosjeani	.	.	+	.
Hermanites paijenborchiana	?	.	?	.
Hirsutocythere horrescens	?	.	+	.
Kingmaina forbesiana	.	.	+	.
Krithe rutoti	.	.	+	.
Leguminocythereis striatopunctata	?	.	?	.
Pterygocythereis cornuta	.	.	+	.
Schizocythere tessellata.	.	.	+	.

? : occurrence at this locality uncertain, mixed material.

TABLE 3. — **Lutetian of Belgium and the Paris Basin** (coll. BOSQUET).

	Belgium	France																
	Saint-Josse-ten-Noode	Chambors	Chamery	Chateaurouge	Chaumont	Courtagnon	Damery	Ferme de l'Orme	Grignon	Hermonville	Houdan	Marguerie	Montmirail	Nanteuil	Parnes	Saint-Félix	Le Vivray
Aglaiocypris enigmatica	.	.	.	.	?	.	.	?	?	.	.	.	.	.	.	.	.
Aulocytheridea faboides	+	.	.	.	.	.	.	?	?	.	.	.	.	.	.	.	.
Bairdoppilata gliberti	.	.	?	?	?	.	.	?	?	.	?	.	?	.	?	?	?
Brachycythere ventricosa	.	.	.	.	?	.	.	?	?	.	.	.	.	.	?	.	.
Bradleya approximata	.	?	.	.	?	.	.	?	?	.	.	.	.	.	?	?	.
Bradleya bosquetiana	.	.	?	.	.	.	?	?	?	.	?	.	?	?	?	?	.
Bythocypris cuisensis	+	.	.	.	?	.	.	?	?	.	.	.	.	.	.	.	.
Clithrocytheridea appendiculata	.	.	.	.	?	.	.	?	.	.	.	.	.	.	.	.	.
Clithrocytheridea lerichei	.	.	?	?	?	?	.	.	?	.	.	.	.	.	?	?	.
Cuneocythere (M.) subovata	.	.	.	.	.	.	?	.	.	.	.	.	?	.	.	.	.
Cuneocythere (M.) oblonga	.	.	.	.	.	?	?	?	.	.	.	.	?	.	?	.	.
Cuneocythere (M.) foveolata	.	.	?	?	?	?	?	?	?	.	.	.	?	.	?	?	?
Cyprideis (G.) apostolescui	.	.	.	.	.	.	.	.	.	?	.	.	.	.	.	?	.
Cypridina homoedwardsiana	.	.	.	?	?	.	.	?	?	.	.	.	.	.	?	.	.
Cytherella münsteri	.	.	?	.	?	.	?	?	?	?	.	.	?	.	.	?	?
Cytherella pustulosa	.	.	?	.	?	.	.	?	?	?	.	.	?	.	.	?	?
Cytherelloidea dameriacensis	.	.	.	.	.	.	.	.	?	.	.	.	?	.	?	.	.
Cytherelloidea hieroglyphica	.	.	.	.	.	.	.	.	?	.	.	.	?	.	?	.	.
Cytheretta crassivenia	.	.	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Cytheretta eocaenica	.	.	?	?	?	.	.	?	?	.	.	.	.	.	?	?	?
Haplocytheridea perforata	.	.	?	.	?	.	.	?	?	?	.	.	.	.	.	.	.
Haplocytheridea sp.	.	.	.	.	?	.	.	?	.	.	.	.	.	.	.	.	.
Hermanites paijenborchiana	.	?	.	.	?	.	.	.	.	.	.	.	.	.	?	?	.
Hirsutocythere horrescens	.	?	?	?	?	+	.	?	?	.	?	.	?	?	?	?	?
Kingmaina forbesiana	.	.	.	.	?	.	.	?	?	.	.	.	?	?	?	?	.
Krithe rutoti	.	.	?	?	?	?	.	.	?	.	.	.	.	.	?	?	.
Leguminocythereis multicostata	.	.	.	.	?	.	.	?	.	.	.	.	.	.	.	.	.
Leguminocythereis pertusa	.	.	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Leguminocythereis scrobiculata	+	.	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Leguminocythereis striatopunctata	.	.	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Paracytheridea gradata	.	?	.	.	.	.	.	.	?	.	.	.	.	.	?	?	?
Pterygocythereis cornuta	.	.	?	?	?	.	?	?	?	.	?	.	?	?	?	?	.
Quadracythere angusticostata	.	?	?	?	?	.	.	?	?	.	.	.	.	?	+	?	?
Quadracythere lamarckiana	.	.	.	.	?	?	.	.	.	.	.	.	.	.	?	?	.
Quadracythere vermiculata	.	.	.	.	.	.	.	.	?	.	.	.	.	.	?	.	.
Schizocythere appendiculata	.	?	?	?	?	?	?	?	?	.	?	.	?	.	?	?	?
Schizocythere tessellata	+	?	?	?	?	?	?	?	?	.	?	.	?	.	?	?	?
Trachyleberis (T.) aculeata	.	?	?	?	?	.	.	?	?	.	.	.	.	.	?	?	.
Trachyleberis (T.) lichenophora	.	?	?	?	?	.	.	?	?	.	.	.	.	.	?	?	.
Triginglymus angulatopora	.	?	?	?	?	?	?	?	?	.	?	?	?	?	.	?	?
Triginglymus grignonensis	.	?	?	?	?	?	?	?	?	.	?	?	?	?	.	?	?
Triginglymus heistensis	.	?	?	?	?	?	?	?	?	.	?	?	?	?	.	?	?
Triginglymus tenuistriatus	.	?	?	?	?	?	?	?	?	.	?	?	?	?	.	?	?
Xestoleberis subglobosa	.	.	?	?	?	?	.	?	?	.	.	.	.	.	?	?	?

TABLE 4. — **Ledian (= Auversian) of the Paris Basin** (coll. BOSQUET).

	Acy	Auvers	Le Guépelle	Pisseloup	Tancrou	Ver
Bairdoppilata gliberti	.	.	?	?	.	?
Bradleya bosquetiana	.	.	?	?	?	?
Cypridina homoedwardsiana	.	.	.	.	?	?
Cytherella münsteri	.	.	?	?	?	?
Cytheretta costellata	.	+	.	.	+	.
Cytheretta crassivenia	.	+	.	.	.	.
Cytheretta sp.	.	+	.	.	.	.
Haplocytheridea hebertiana	.	.	?	?	.	.
Haplocytheridea perforata	.	.	?	?	.	?
Hirsutocythere horrescens	.	?	?	.	.	?
Kingmaina forbesiana	.	.	+	.	.	.
Leguminocythereis dumonti	.	+	.	.	.	.
Leguminocythereis pertusa	.	.	.	.	+	.
Leguminocythereis scrobiculata	.	.	.	.	+	.
Leguminocythereis striatopunctata	.	.	.	.	+	.
Paracytheridea sp.	.	.	+	.	.	.
Quadracythere angusticostata	.	?	?	.	.	.
Quadracythere orbignyana	?	.	?	?	.	?
Quadracythere vermiculata	.	.	+	.	.	.
Schizocythere tessellata	.	?	?	?	.	?
Trachyleberis (T.) aculeata	.	.	+	.	?	?
Triginglymus angulatopora	.	.	?	?	+	?
Triginglymus heistensis	.	.	.	.	+	.
Xestoleberis subglobosa	.	.	?	?	.	.

TABLE 5. — **Oligocene of the collection BOSQUET.**

	France		Nether-lands	Belgium									
	Stampian		Tongrian									Rupelian	
	Etréchy	Jeurre	Klimmen	Grimmertingen	Leten	Herderen	Kleine-Spouwen	Neerrepen	Tongeren	Borgloon (= Looz)	Oude-Biezen (= Vieux-Joncs)	Berg Nucula-clay	Bazel Boom-clay
Argilloecia jeurrensis	?	?	.	.	.	.	.	.	.	.	.	.	.
Cuneocythere (C.) lienenklausi	.	.	.	.	.	.	.	.	.	.	.	+	.
Cuneocythere (C.) marginata	.	.	.	.	.	.	.	.	.	.	.	+	.
Cyprideis (G.) williamsoniana	.	.	?	.	.	?	?	.	?	?	?	?	.
Cytherella beyrichi	.	.	.	.	.	.	.	.	.	.	.	+	.
Cytherella compressa	.	.	.	.	.	.	.	.	.	.	.	+	+
Cytherella jonesiana	?	?	.	.	.	.	.	.	.	.	.	.	.
Cytheretta concinna	?	?	.	.	.	.	.	.	.	.	.	+	.
Cytheretta costellata (contamination ?)	.	.	.	.	.	.	.	.	.	.	.	.	+
Cytheretta tenuipunctata	?	?	.	.	.	.	.	.	.	?	?	?	.
Cytheridea pernota	?	?	?	.	?	?	?	?	?	?	?	?	.
Echinocythereis hispida	?	?	.	.	.	.	.	.	.	.	.	.	.
Haplocytheridea helvetica	?	?	?	?	?	?	?	?	?	?	?	?	.
Haplocytheridea henisensis	.	.	?	.	?	?	?	?	?	?	?	?	.
Hemicytherideis lithodomoides	?	?	.	.	.	.	.	.	.	.	.	+	.
Hermanites hebertiana	?	?	.	.	.	.	.	.	.	.	.	+	.
Leguminocythereis scrobiculata	?	?	.	?	?	.	.	.	.	.	.	+	.
Leguminocythereis striatopunctata	.	?	.	.	?	.	.	.	.	.	.	.	.
Loxoconcha kuiperi	.	.	.	.	.	.	.	.	.	.	.	+	.
Loxoconcha nystiana	.	.	.	.	.	.	.	.	.	.	.	+	.
Loxoconcha subtriangularis	.	.	.	.	.	.	.	.	.	.	.	+	.
Paracyprideis rarefistulosa	?	?	.	.	.	.	.	.	.	.	.	?	.
Paracytheridea sp.	+	.	.	.	.	.	.	.	.	.	.	.	.
Pokornyella limbata	?	?	.	.	.	.	.	.	.	.	.	.	.
Pterygocythereis fimbr. fimbriata	?	?	.	.	.	.	.	.	.	.	.	+	+
Quadracythere macropora	?	?	.	.	.	.	.	.	.	.	.	.	.
Trachyleberis asperrima echinata	.	.	.	.	.	.	.	.	.	.	.	.	+
Triginglymus angulatopora (contam. ?)	.	+	.	.	.	.	.	.	.	.	.	.	.

TABLE 6. — **Miocene and Pliocene of the collection BOSQUET.**

	France						Belgium
	Miocene					Pliocene	Mio-Pliocene
	Dax	Léognan	Merignac	Saint-Avit	Pontlevoy	Perpignan	Antwerp
Aurila cicatricosa	.	.	.	.	.	+	.
Aurila punctata	.	.	.	.	.	+	.
Aurila sp.	.	.	.	.	.	+	.
Bosquetina pectinata	.	.	.	.	.	+	.
Bythocypris arcuata	?	?	?	.	.	.	.
Carinocythercis carinata..	.	.	.	.	.	+	.
Cytheretta jurinei	?	?	?	.	.	.	.
Cytheretta ramosa sublaevis...	?	?	?	.	.	.	.
Cytheretta rhenana rhenana	?	?	?	.	.	.	.
Cytheridea pernota	.	.	.	.	+	.	.
Cytheridea sp.	.	.	.	.	.	.	+
Echinocythereis scabra	?	?	.	.	.	+	.
Falunia plicatula	?	?	.	.	.	.	.
Haplocytheridea strigulosa	?	?	?	?	.	.	.
Hemicytherideis curvata	?	?	?	.	.	.	.
Krithe papillosa	?	?	?	.	.	.	.
Loxoconcha gratelouplana	?	?	?	.	.	.	.
Loxoconda punctatella	.	.	.	.	.	+	.
Neocytherideis linearis	?	?	?	.	.	.	.
Paracytheridea fenestrata	.	?	?	.	.	.	.
Pterygocythereis fimbriata fimbriata	?	?	.	.	.	.	.
Ruggieria micheliniana	+	.	.	.	.	.	.
Ruggieria sp.	.	.	.	.	.	+	.
Schizocythere sp.	.	.	.	.	.	+	.
Trachyleberis (Costa) edwardsi	?	?	?	.	.	+	.
(?) *Urocythereis bidentata*	+	.	.	.	.	.	.
Urocythereis favosa	.	.	.	.	.	+	.
Xestoleberis sp.	.	.	.	.	.	+	.

SYSTEMATIC DESCRIPTION

Order OSTRACODA Latreille, 1806.

Suborder MYODOCOPA Sars, 1866.

Family **CYPRIDINIDAE** Baird, 1850.

Genus CYPRIDINA Milne-Edwards, 1840.

Type species **Cypridina Reynaudi** Milne-Edwards, 1840.

Diagnosis. — Carapace more or less ovate with rostral incisure in the middle of the anterior end and a downward curved beak above it; surface smooth or pitted; muscle-scar circular and complicate, composed of several horizontal, oblique and vertical rows of small round scars; hinge without teeth.

Range : Paleozoic to recent.

Cypridina homoedwardsiana n. nom.

Pl. VII, figs. 16-18; Pl. XVIII, figs. 15-16.

Cyprella edwardsiana Bosquet, 1852, vol. 24, p. 132, pl. 6, fig. 14
Cypridina edwardsiana (Bosquet),Apostolescu, 1955, p. 242, pl. 1, fig. 1-3.

Lectotype : A left valve (coll. Bosquet, No. 83*b*).

Paratypoids : 7 detached valves (coll. Bosquet, Nos. 83 and 83*b*).

Locus-typicus-restrictus : Grignon, France.

Type-level : Lutetian.

Distribution. — France : Paris Basin : Lutetian of Châteaurouge, Parnes, Chaumont, Ferme de l'Orme, Grignon, Mouchy-le-Châtel, Gomerfontaine, Damery, Montmirail-les-Marais, Neauphle-le-Ctâteau; Ledian of Ver and Tancrou.

Diagnosis. — A species of the genus *Cypridina* with the following characteristics : surface covered with coarse and angular depressions; dorsal margin of the left valve evenly arched; dorsal margin of the right valve with distinct cardinal angles; caudal process smooth; beak with dorsal angle.

Description. — The dorsal margin of the left valve is evenly arched. Sometimes there is a faint indication of cardinal angles. Anteriorly and posteriorly of the anterior cardinal angle the margin is straight. The beak of both valves is fairly strongly projecting

and dorsally angled. The adjoining notch is wide and rounded dorsally. The ventral margin in convex. Posteriorly the valve is drawn out into a broad triangular caudal process. Below this extension the posterior margin is concave.

The surface of the valves is covered by fairly large angular depressions, excepting the caudal process, which is smooth.

The left valve overlaps the right one along its entire margin.

The marginal area is narrow. The line of concrescence and the inner margin do not coincide exactly; there is a vestibulum in the beak. In the caudal extension of the right valve there is a deep depression, surrounded by two ridges.

The central muscle-scar, which is circular and complicate, is to be found in the anterior half of the valve. The anterior half of the scar is composed of four slightly curved and obliquely running rows of five to seven rounded scars. Two vertical rows of three scars and one of four scars are situated above them. The posterior half consists of five short rows of two scars each.

The dorsal margin of the right valve fits into a groove of the left one. This groove is obscured by an overhanging ridge.

Dimensions. — Lectotype (left valve) : L : 1,23, H : 0,75, $\frac{1}{2}$W : 0,45; paratypoid (right valve) : L : 1,25, H : 0,78, $\frac{1}{2}$W : 0,38.

Remarks. — The collection Bosquet contains one right and seven left valves of this species. We furthermore found four right valves and two left ones in the Lutetian III and IV of Grignon, where the species is evidently very rare.

The species described by Bosquet as *Cyprella edwardsiana* is incorporated in the genus *Cypridina, Cyprella* being a Paleozoic genus of quite different habitat. In 1841 De Koninck (Mémoire sur les crustacés fossiles de Belgique; Acad. Royal Sc. et Belles Lettres, Brussels, Nouv. Mém., Vol 14, p. 17, pl. 1, fig. 9) described a species from the Belgian Lower Carboniferous as *Cypridina edwardsiana.* So Bosquet's species name becomes a subjective homonym of that of De Koninck. The new name *Cypridina homoedwardsiana* is proposed here.

Cypridina homoedwardsiana differs in ornamentation from the Cretaceous *Cypridina koninckiana* (Bosquet) : the latter is smooth in the anterior half of the valves. In outline both species agree fairly well.

Suborder PLATYCOPA Sars, 1866.

Family **CYTHERELLIDAE** Sars, 1866.

Genus CYTHERELLA Jones, 1849.

Type species **Cytherina ovata** Roemer, 1840.

Diagnosis. — Carapace thick-shelled, ovate, elliptical or rounded off quadrangularly. Right valve overlaps left one all around. Surface smooth to punctated. Muscle-scar feather-shaped, consisting of two rows of scars; it is situated on a more or less distinct elevation, which often corresponds to a depression on the exterior. Sexual dimorphism distinct; the females have an indistinct internal ridge which separates the posterior and anterior parts of the valve's interior.

Range : Silurian to recent.

Cytherella beyrichi (Reuss).

Pl. I, figs. 8-9.

Cytherina beyrichi Reuss, 1851, vol. 3, p. 89, pl. 7, fig. 65.
Cytherella beyrichi (Reuss), Bornemann, 1855, vol. 7, p. 354, pl. 20, fig. 1; Kuiper, 1918, p. 81, pl. 3, fig. 34.

Distribution. — Belgium : Rupelian. Netherlands : Middle Oligocene-Miocene. Germany : Oligo-Miocene.

Remarks. — This species is quite variable in outline and punctation. The males are lower and more elongate than the females. Their dorsal margin often slopes gradually towards the posterior end, which is less broadly rounded than in the females.

Cytherella compressa (von Münster).

Pl. I, fig. 10.

Cythere compressa von Münster, 1830, p. 64
Cytherina compressa (von Münster), Roemer, 1838, p. 517, pl. 6, fig. 14.
Cytherella compressa (von Münster), Bosquet, 1852, vol. 24, p. 11, pl. 1, fig. 1; Jones, 1857, p. 54, pl. 5, fig. 21, 23.

Distribution. — Belgium : Upper Ypresian-Rupelian. Netherlands : Bartonian of borings Almelo and Delden, Rupelian of Winterswijk and Kuipersberg. England : Ypresian-Bartonian; Germany : Oligo-Miocene.

Cytherella jonesiana Bosquet.

Pl. I, fig. 11.

Cytherella jonesiana Bosquet, 1852, vol. 24, p. 16, pl. 1, fig. 4.

Lectotype : A right valve (coll. Bosquet, No. 4).

Paratypoids : 11 detached valves (coll. Bosquet, No. 4).

Type-locality : Jeurre or Etréchy, France.

Type-level : Stampian (=Oligocene).

Diagnose. — A species of the genus *Cytherella* which is characterized by a broad, rounded, anterior marginal rim; a high, curved ridge, parallel to the posterior margin; and the coarsely pitted surface with an elongate, smooth area in the centre.

Description. — The dorsal margin is wavy; its posterior part is convex. The anterior margin is broadly rounded. The ventral margin is slightly concave. The posterior margin is sub-truncate to broadly rounded.

There is a broad, smooth, rounded anterior marginal rim. Parallel to the posterior margin there runs a smooth, high and curved ridge, which is highest in its ventral part. In the left valve a smooth ridge connects the anterior marginal rim and the posterior vertical ridge.

The lateral surface is slightly undulated. It is coarsely pitted, with the exception of the marginal rims, a zone along the dorsal margin and an elongate area in the centre, that corresponds with the muscle-scar of the interior.

In dorsal view the carapace is wedge-shaped with a truncate posterior end.

The internal features are as for the genus.

Dimensions. — Lectotype (right valve) : L : 0,76, H : 0,40, ½W : 0,18; paratypoid (left valve) : L : 0,73, H : 0,39, ½W : 0,15.

Remarks. — This species resembles *Cytherella praesulcata* LIENENKLAUS (1894, p. 265, pl. 18, fig. 9) in outline and ornamentation. According to LIENENKLAUS who compared both species, *C. jonesiana* is different from *C. praesulcata* by the absence of a deep groove along the anterior margin.

Cytherella münsteri (ROEMER).

Pl. I, fig. 7.

Cytherina münsteri ROEMER, 1838, p. 516, pl. 6, fig. 13.
Cytherella münsteri (ROEMER), BOSQUET, 1852, vol. 24, p. 13, pl. 1, fig. 2; JONES, 1857, p. 56, pl. 5, fig. 12-13.
Morrowina münsteri (ROEMER), APOSTOLESCU, 1955, p. 243, pl. 1, fig. 4, 5.

Distribution. — Belgium : Lutetian and Ledian. France : Upper Ypresian-Ledian. England : Ypresian-Bartonian.

Remarks. — In the Bartonian deposits of England some smooth specimens were found together with normal punctate individuals. The same relations had been observed by JONES.

Cytherella pustulosa n. sp.

Pl. I, figs. 5-6.

Holotype : A right valve (S 2881).

Paratypoids : 7 detached valves (S 1657, 1658, 2882) and two valves belonging to one carapace (coll. BOSQUET, No. 2*b*).

Type-locality : Grignon, France.

Type-level : Lutetian IV.

Distribution. — Belgium : Ledian of Balegem, and probable Ledian of boring Heist-op-den-Berg. France : Lutetian of Grignon and one of the following localities, mentioned by BOSQUET : Chaméry, Chaumont, Ferme de l'Orme, Grignon, Hermonville, Montmirail, Saint-Félix and Le Vivray.

Diagnosis. — A species of the genus *Cytherella* with the following characteristics : carapace elongate, sub-truncate posteriorly; muscle-scar pit marked; surface faintly reticulate, with elongate depressions in curved rows and with small knobs towards the anterior margin.

Description. — The dorsal margin is obtusely angled behind the middle. The anterior margin is broadly rounded and denticulate. The ventral margin is straight to concave. The posterior margin is obliquely truncate. In dorsal view the carapace is wedge-shaped.

The surface is ornamented with elongate depressions, of elliptical shape arranged in concentric rows. In the ventral and anterior region the indistinct ridges between the depressions are transformed into rows of small knobs. The Belgian Upper Eocene specimens have an almost smooth surface, at least in their posterior part. The muscle-scar pit is elongate and rather deep.

Dimensions. — Holotype (female right valve) : L : 0,84, H : 0,42, ½W : 0,20.

Remarks. — *Cytherella pustulosa* shares its outline and musclescar pit with several species of *Cytherella*, but in its ornamentation it stands quite apart. It is considered unjustified to recognize a separate genus (*Morrowina* LOETTERLE, 1937, Nebraska Geol. Surv., Bull., No. 12, p. 51) for the *Cytherella* with a muscle-scar pit, since this character is not constant even within one species.

Cytherella transversa SPEYER.

Pl. I, fig. 2.

Cytherella transversa SPEYER, 1863, vol. 13, p. 56, pl. 1, fig. 2.

Distribution. — Belgium : Rupelian. Netherlands : Middle and Upper Oligocene of the boring Liessel (190-398 m). France : Oligocene of Saint-Etienne-d'Orthe, Aquitaine Basin. Germany : Upper Oligocene of the region of Cassel.

Remarks. — Only left valves were found in our material. In Belgium and in France this species was not found accompanied by the very similar *C. beyrichi* from which it differs by the higly developed postero-ventral flange. In KUIPER's material we found both species together in one tube, but the material was derived from a tract of 200 m in the boring Liessel.

Genus CYTHERELLOIDEA ALEXANDER, 1929.

TYPE SPECIES **Cythere (Cytherella) Williamsoniana** JONES, 1849.

Diagnosis. — Carapace rounded-off quadrangularly, greatest width near the posterior end. Surface ornamented with ridges, plications, pits and marginal spines. Overlap and internal features as in *Cytherella*.

Range : Jurassic to recent.

Cytherelloidea dameriacensis APOSTOLESCU.

Pl. I, fig. 3.

Cytherelloidea dameriacensis APOSTOLESCU, 1955, p. 244, pl. 1, fig. 7.

Distribution. — Belgium : Lutetian-Bartonian. England : Ledian of Wight. France : Lutetian.

Cytherelloidea hieroglyphica (BOSQUET).

Pl. I, fig. 4.

Cytherella hieroglyphica BOSQUET, 1852, vol. 24, p. 15, pl. 1, fig. 3.
Cytherelloidea hieroglyphica (BOSQUET), APOSTOLESCU, 1955, p. 244, pl. 1, fig. 8.

Lectotype : A complete carapace (coll. BOSQUET, No. 3).

Paratypoids : One badly damaged valve (coll. BOSQUET, No. 3*c*).

Locus-typicus-restrictus : Grignon, France.

Type-level : Lutetian.

Distribution. — Belgium : Lutetian of Saint-Job and Forest (Brussels), Hoegaarden, Diegem, Braine-l'Alleud, and Nalinnes. France : Upper Ypresian of Ménilmontant (Paris); Lutetian of Grignon, Parnes, Montmirail, Gomerfontaine, Villiers-Saint-Frédéric.

Diagnosis. — A species of the genus *Cytherelloidea* with the following characteristics : ornamentation consisting of an anterior and ventral marginal rim, a posterior high, vertical ridge and three curved longitudinal ridges, two below, and one above the muscle-scar depression.

Description. — Sexual dimorphism is distinct. In dorsal view the females are wedge-shaped and strongly swollen near their posterior end, while the males are more elliptical.

The posterior two thirds of the dorsal margin are arched. The anterior margin is broadly rounded and sometimes provided with faint indications of marginal spines. The ventral margin is concave in the middle. The posterior end is truncate.

There is a marginal rim along the anterior and ventral margins. In the postero-ventral corner it turns abruptly upwards, running as a high ridge in a vertical direction up to the dorsal margin. The surface ornamentation further consists of three curved longitudinal ridges : one above and two below the muscle-scar depression. The upper and lower ones reach the posterior vertical ridge, the third, middle one joins the upper ridge at some distance behind the muscle-scar depression. Finally, another short ridge is found on the postero-dorsal part of the valve, coalescing with the uppermost of the three longitudinal ridges, just above the muscle-scar depression. The surface is finely pitted.

The internal features are as for the genus.

Dimensions. — Lectotype (complete female carapace) : L : 0,67, H : 0,34, W : 0,26. Female right valve of Nalinnes : L : 0,72, H : 0,39, $\frac{1}{2}$W : 0,15.

Remarks. — In Belgium and France this species is restricted to the Lower and Middle Eocene. In the Upper Eocene it is replaced by *Cytherelloidea dameriacensis* Apostolescu.

Cytherelloidea umbonata Edwards (Journ. of Pal., 1944, Vol. 18, p. 506, pl. 85, figs. 1-2) from the Miocene of North Carolina resembles *C. hieroglyphica* very much. Well preserved specimens of the latter also possess anterior marginal spines and a pitted surface; but they are different in the configuration of the longitudinal ridges.

Family **HEALDIIDAE** Harlton, 1933.

Genus PLATELLA Coryell and Fields, 1937.

Type species **Platella gatunensis** Coryell and Fields, 1937.

Diagnosis. — Carapace subquadrangular, fairly thin-shelled, with musclescar pit; ornamentation with pits and/or striae; muscle-scar a group of irregularly scattered scars.

Range : Palaeocene to Miocene.

Platella gyrosa (ROEMER).

Pl. I, fig. 1.

Cytherina gyrosa ROEMER, 1838, p. 517, pl. 6, fig. 22.
Platella gyrosa (ROEMER), APOSTOLESCU, 1955, p. 244, pl. 1, fig. 6.

Distribution. — Belgium : Upper Ypresian-Bartonian. Netherlands : Bartonian of the boring Delden and Ypresian (?) and Bartonian of the boring Almelo. France : Lutetian of the Paris Basin.

Remarks. — Because of the central muscle scar, which consists of a number of irregularly scattered round scars in a circular area, this genus is placed in the family *Healdiidae*.

Suborder PODOCOPA SARS, 1866.

FAMILY **CYPRIDIDAE** BAIRD, 1850.

SUBFAMILY **PONTOCYPRIDINAE** G. W. MÜLLER, 1894.

Genus ARGILLOECIA SARS, 1866.

TYPE SPECIES **Argilloecia cylindrica** SARS, 1866.

Diagnosis. — Carapace elongate with curved dorsal margin, posterior end pointed below. Right valve slightly larger than the left one. Surface smooth. Marginal area rather narrow, except along the ventral margin; large anterior and posterior vestibules. Radial pore-canals numerous. Muscle-scar with anterior row of three scars and two posterior scars. Hinge without teeth. Distinct sexual dimorphism.

Range : Cretaceous to recent.

Argilloecia jeurrensis n. sp.

Pl. I, figs. 12-14.

Bairdia arcuata, BOSQUET (pars) (non VON MÜNSTER), 1852, vol. 24, p. 32.

Holotype : A left valve (coll. BOSQUET, No. 14*b*).

Paratypoids : 21 detached valves (id.).

Type-locality : Jeurre or Etréchy, Paris Basin, France.

Type-level : Oligocene (Stampian of the Paris Basin).

Diagnosis. — A species of the genus *Argilloecia* with the following characteristics : length approximately 2,50 times the height; rounded postero-ventrally.

Description. — The dorsal margin is evenly rounded; it merges gradually into the anterior and posterior margins. The anterior margin is rather narrowly rounded. The ventral outline of the left valve is straight, that of the right valve is concave before the middle. The posterior margin is rounded below.

The surface is smooth.

The marginal area is narrow along the anterior and posterior margin, and rather broad along the ventral margin. The anterior and posterior vestibules are large and deep. Along the anterior margin the radial pore-canals are numerous, as far as they are visible. Along the ventral margin they are fairly widely spaced and often bifurcating.

The central muscle-scar consists of a lower part with at least six scars and an upper part of three scars.

Dimensions. — Holotype (left valve) : L : 1,03, H : 0,43, $\frac{1}{2}$W : 0,21.

Remarks. — This species resembles *Argilloecia cylindracea* (Bornemann) of the German Oligocene. According to Bornemann and Lienenklaus (1900) the latter species is three times as long as high, while our specimens are maximally 2,6 times as long as high.

Subfamily **CYPRIDINAE** G. W. Müller, 1894.

Genus AGLAIOCYPRIS Sylvester-Bradley, 1947.

Type species **Aglaia pulchella** Brady, 1868.

Diagnosis. — Carapace elongate, highest near the middle, surface smooth; marginal area narrow, radial pore-canals fairly numerous and simple, with large vestibules; muscle-scar with anterior row of four scars and two scars behind it. Hinge without teeth.

Range : Eocene (?) to recent.

Aglaiocypris enigmatica n. sp.

Pl. VII, figs. 19-21.

Bairdia arcuata, Bosquet (pars) (non von Münster), 1852, vol. 24, p. 32.

Holotype : A left valve (S 2886).

Paratypoids : 2 complete carapaces and 10 detached valves (coll. Bosquet, No. 14c and S 2887).

Type-locality : Grignon, France.

Type-level : Lutetian IV.

Distribution. — France : Lutetian of Grignon, Chaumont and Ferme de l'Orme.

Diagnosis. — A species of the genus *Aglaiocypris* with the following characteristics : dorsal margin short, straight and oblique; anterior margin strongly drawn-out ventrally; posterior end steeply sloping.

Description. — Middle part of the dorsal margin is mostly short, straight and backward sloping. The anterior and posterior margins are narrowly rounded and drawn out ventrally. The ventral margin is slightly concave in the middle; the dorsal part of the posterior margin slopes steeply and is almost straight.

The left valve overlaps the right one along the entire margin, but most strongly so dorsally and ventrally.

The surface is smooth.

The marginal area is very narrow along the anterior and posterior margins, rather broad along the ventral margin. The anterior and posterior vestibules are large and deep. As far as could be detected, some simple radial pore-canals are situated along the anterior margin.

Some 16 of them were observed along the ventral margin. They are most closely spaced antero-ventrally.

The dorsal margin and parts of the anterior and posterior margins of the right valve fit into a groove of the other valve.

The central muscle-scar consists of a row of four elongate scars. Two other scars lie behind the lower half of this row, the upper scar being larger.

Dimensions. — Holotype (left valve) : L : 0,71, H : 0,33, $\frac{1}{2}$W : 0,14.

Remarks. — With some hesitation this species is assigned to the genus *Aglaiocypris*. Overlap, configuration of the central muscle-scar, marginal area and vestibules favour this decision, but the straight part of the dorsal margin does not fit in with the earlier described species.

Genus PARACYPRIS SARS, 1866.

TYPE SPECIES **Paracypris polita** SARS, 1866.

Diagnosis. — Carapace large, highest before the middle, pointed postero-ventrally. Surface smooth. Left valve overlaps right one antero-dorsally. Hinge without teeth. Marginal area moderately broad, radial pore-canals fairly numerous and complicate; with large vestibules. Muscle-scar with anterior row of three or four scars and two scars behind them.

Range : Silurian to recent.

Paracypris contracta (JONES).

Pl. I, figs. 15-17.

Bairdia contracta JONES, 1857, p. 53, pl. 5, fig. 1.

Distribution. — Belgium : Lutetian-Bartonian. France : Ledian of Auvers: England : Bartonian of Barton Cliff.

Remarks. — We had the disposal of a single, though damaged left valve from the Bartonian of Barton Cliff, from which it became evident that JONES' species must be placed in the family *Cyprididae*. From the abundant material of the Belgian Eocene the details of this species could be studied and resulted in its placing into the genus *Paracypris*.

The left valve overlaps the right one; the strongest overlap is antero-dorsally and ventrally. Both vestibules are very large. The radial pore canals are bifurcating or intricately branching. The hinge consists of a long, rather narrow, curved groove in the left valve into which the dorsal free edge of the right valve fits. The central muscle-scar is circular and composed of some 6 scars. The 4 scars of the anterior row are often composed of 2 or 3 quadrangular scars each. Two elongate scars lie antero-ventrally of this area. Above them another small round scar was observed. At least two more scars could be observed near the dorsal margin.

Paracypris sp.

Fig. 7.

D i s t r i b u t i o n . — Belgium : Bartonian of boring 48 (23,50 m) at 300 m N-850 m W of Strombeek-Bever church (N of Brussels) with *Nummulites wemmelensis*.

R e m a r k s . — Only two valves were found.

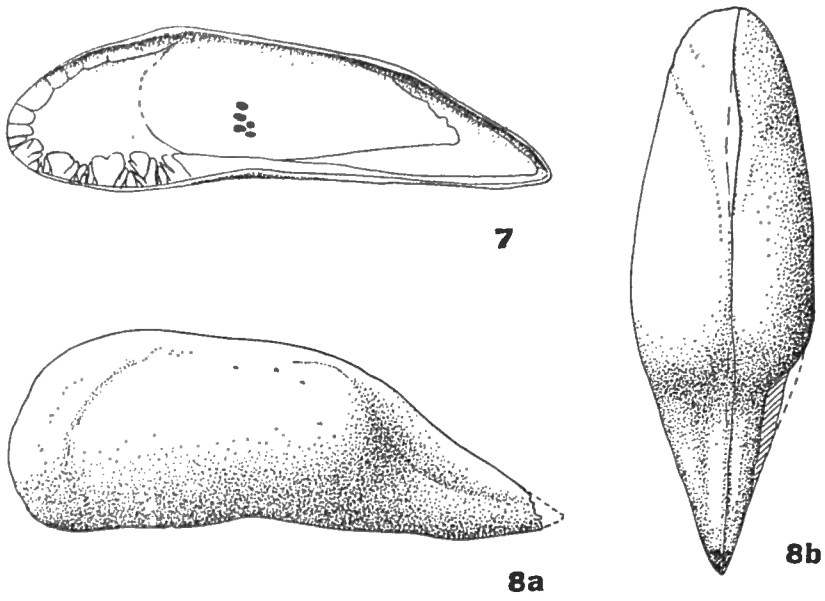

FIG. 7. — *Paracypris* sp.
Internal view of right valve (100×); Bartonian of boring 48, Brussels.

FIG. 8. — (?) *Paracypris* sp.
a : lateral view, and b : dorsal view of complete carapace (100×);
Lutetian of Forest (BD 391).

(?) **Paracypris** sp.

Fig. 8.

D i s t r i b u t i o n . — Belgium : Lutetian of Saint-Job (BA 105) and Forest (BD 391), Brussels.

R e m a r k s . — Our few specimens have the outline of *Paracypris*, but their postero-dorsal swelling would be an aberrant feature in this genus.

FAMILY **BAIRDIIDAE** SARS, 1888.

SUBFAMILY **BAIRDIINAE** SARS, 1923.

Genus BAIRDIA M'COY, 1844.

Bairdia sp.

R e m a r k s . — Juvenile or damaged specimens with bairdioid outline were found at several localities. They probably belong to more than one species of the genus *Bairdia*.

Genus BAIRDOPPILATA CORYELL, SAMPLE and JENNINGS, 1935.

TYPE SPECIES **Bairdoppilata martyni** CORYELL, SAMPLE and JENNINGS, 1935.

Diagnosis. — Carapace subrhomboidal to subtriangular, with marked anterior and posterior angles. Sometimes with marginal spines. Surface smooth or pitted. Left valve overlaps the right one along entire dorsal and middle part of ventral margin. Marginal area moderately broad and with vestibules. Musclescar circular, consisting of many irregularly shaped scars. Hinge of the right valve as in *Bairdia*, but with additional dental areas just above the anterior and posterior angles.

Range : Cretaceous to Miocene (recent ?).

Bairdoppilata gliberti n. sp.

Pl. I, figs. 18-21.

Bairdia subdeltoidea, BOSQUET (non VON MÜNSTER), 1852, vol. 24, p. 29, pl. 1, fig. 13; JONES and SHERBORN, 1889, p. 16, pl. 1, fig. 15; APOSTOLESCU, 1955, p. 245, pl. 1, fig. 9, 10.

Etymology : Named after Dr. M. GLIBERT of the Royal Belgian Institute of Natural Sciences, Brussels.

Holotype : A left valve (S 2888).

Paratypoids : Some 150 detached valves and 30 complete carapaces (S 1709-1716, 2797, 2856, 2889, 2890) (coll. BOSQUET, No. 13*c*, *d*, *e*).

Type-locality : Grignon, France.

Type-level : Lutetian IV.

Distribution. — Belgium : Lutetian of Gobertange and Forest; Ledian of Forest (Brussels), Meldert, Bambrugge; Ledian (?) and Bartonian of the boring Heist-op-den-Berg. France : Upper Ypresian of Cuise-Lamotte, Epernay, Ménilmontant (Paris) and Soissons; Lutetian of Grignon, Saint-Félix, Houdan, Châteaurouge, Ferme de l'Orme, Chaumont, Chaméry, Le Vivray, Montmirail and Parnes; Ledian of Guépelle, Pisseloup and Ver. England : Bartonian of Barton Cliff.

Diagnosis. — A species of the genus *Bairdoppilata* with the following characteristics : Left valve with greatest height just in front of the middle and with straight or very slightly concave ventral margin; right valve with middle part of dorsal margin horizontal or sloping backward, and with strong concavity before the middle of the ventral margin.

Description. — The left valve has a strongly arched dorsal margin. The greatest height is situated just in front of the middle. Just behind the highest point there is sometimes a straight part in the dorsal margin. The anterior and posterior ends of the dorsal margin are straight. The anterior margin merges gradually into the almost straight ventral margin. The posterior margin is slightly convex, forming an obtuse angle with the dorsal margin. The dorsal margin of the right valve consists of three straight parts, the middle one of which

is horizontal or sloping backward. The anterior margin is convex. The ventral margin has a strong concavity before the middle. The posterior margin is convex and sometimes fringed with some small marginal spines.

The surface is finely pitted or smooth, dependent on the good or bad state of preservation.

The hinge, muscle-scar and marginal area are as for the genus.

Dimensions. — Holotype (left valve) : L : 1,33, H : 0,81, ½W : 0,41; paratypoid (right valve) : L : 1,35, H : 0,75, ½W : 0,31.

Remarks. — *B. gliberti* is somewhat variable in outline. In addition to the average form described above, much higher and more rounded specimens occur as well. The specimens of the Lutetian of the Paris Basin figured by APOSTOLESCU belong to this species.

As far as could be established from the figures, *Bairdia subdeltoidea* as given by JONES and SHERBORN, pertains to *Bairdoppilata gliberti*. Typical *Bairdia subdeltoidea* is much more rounded at its anterior and posterior cardinal angles.

Our species resembles the Upper Cretaceous *Bairdoppilata pondera* JENNINGS (Bull. Am. Pal., Vol. 23, No. 78, p. 45, pl. 6, fig. 9), but on the average the anterior cardinal angle of our specimens is situated somewhat higher. Moreover, the right valves of *Bairdoppilata gliberti* are distinctly concave ventrally, while *Bairdoppilata pondera* is straight in its corresponding part of the outline.

Bairdoppilata sp.

Pl. I, fig. 22.

Remarks. — Some valves of an unknown species of *Bairdoppilata* were found in the Lutetian of Grignon. They are much more elongate than those of *B. gliberti*.

Genus BYTHOCYPRIS BRADY, 1880.

TYPE SPECIES **Bythocypris reniformis** BRADY, 1880.

Diagnosis. — Carapace reniform or subtriangular. Left valve overlaps right one dorsally and ventrally. Surface smooth. Radial pore-canals moderately numerous, partly very complicated; with large anterior vestibule. Hinge without teeth. Musclescar circular, consisting of many scars.

Range : Paleozoic to recent.

Bythocypris arcuata (VON MÜNSTER).

Pl. II, fig. 1.

Cythere arcuata VON MÜNSTER, 1830, p. 63.

Cytherina arcuata (VON MÜNSTER), ROEMER, 1838, p. 517, pl. 6, fig. 17; REUSS, 1850, vol. 3, p. 51, pl. 8, fig. 7.

Bairdia arcuata (VON MÜNSTER), BOSQUET (pars), 1852, vol. 24, .p 38, pl. 1, fig. 14; SPEYER, 1863, p. 41, pl. 1, fig. 3.

Macrocypris (?) *arcuata* (VON MÜNSTER), KUIPER, 1918, p. 10, pl. 1, fig. 1.

Bythocypris arcuata (VON MÜNSTER), KEIJ, 1955, vol. 21, n° 2, p. 104, pl. 15, fig. 10.

Distribution. — Netherlands : Oligo-Miocene. Germany : Oligo-Miocene. Austria : Miocene. France : Miocene.

Bythocypris cuisensis n. sp.

Pl. II, figs. 3-6.

Bairdia arcuata, BOSQUET (pars) (non VON MÜNSTER), 1852, vol. 24, p. 38.

Holotype : A left valve (coll. BOSQUET, No. 14*d*).

Paratypoids : 35 detached valves and 5 complete carapaces (coll. BOSQUET, No. 14*c*, *d*, *e* and S 1717-1723, 2857, 2858).

Type-locality : Cuise-Lamotte, France.

Type-level : Cuisian (Upper Ypresian).

Distribution. — Belgium : Upper Ypresian of Hyon, Forest (Brussels), Mont-Saint-Aubert; Lutetian of Godarville, Saint-Josse-ten-Noode (Brussels); Ledian of Bambrugge and Vlierzele; and probable Ledian of the boring Heist-op-den-Berg. France : Upper Ypresian of Cuise-Lamotte; Lutetian of Chaumont, Ferme de l'Orme and Grignon.

Diagnosis. — A species of the genus *Bythocypris* with the following characteristics : part of the dorsal margin of the left valve straight between two obtuse angles; with angle approximately at the middle of the valve's length.

Description. — Sexual dimorphism has been observed. The males are somewhat more elongate than the females.

Part of the dorsal margin of the left valve is straight and slopes backward behind the middle. There is an obtuse angle, situated in the middle of the dorsal margin. The posterior obtuse angle is less apparent. The anterior margin is broadly rounded. The ventral margin is straight or slightly concave. The posterior margin is rounded below.

The dorsal margin of the right valve is evenly rounded, sometimes with a faintly developed, straight portion behind the middle. The anterior margin is broadly rounded and somewhat drawn-out ventrally. The ventral margin is strongly concave. The posterior margin is as for the left valve.

In dorsal view the carapace is asymmetrically ovate. The right valve's outline is straight for more than half its length, while the outline of the left valve is evenly rounded.

The anterior and posterior vestibules are large and deep. Some 15 short, straight and simple radial pore-canals were observed along the dorsal and anterior part of the anterior vestibule. Along its ventral part there are some 5 very complicated bundles of pore-canals, each originating from a communal stem. Some 35 partly simple, partly bifurcating radial pore-canals are situated along the ventral and posterior margins.

The central muscle-scar consists of many rounded scars, situated closely together in a circular area.

Dimensions. — Holotype (female left valve) : L : 1,00, H : 0,52, $\frac{1}{2}$W : 0,25; paratypoid (male left valve) : L : 0,99, H : 0,48, $\frac{1}{2}$W : 0,25.

Remarks. — This species shows many affinities with *Paracypris contracta* (JONES), which is pointed postero-ventrally and less high. Both species have a straight part of the dorsal margin, which feature is uncommon in the genus *Bythocypris*. On the other hand the complicated anterior radial pore-canals, the circular muscle-scar composed of many scars, and the overlap of the left valve point to the genus *Bythocypris*.

FAMILY **CYTHERIDAE** BAIRD, 1850.

SUBFAMILY **CYTHERIDEINAE** SARS, 1925.

Genus CYTHERIDEA BOSQUET, 1852.

TYPE SPECIES **Cythere mülleri** VON MÜNSTER, 1830.

D i a g n o s e . — Carapace ovate, triangular, posterior end often angled below; marginal area fairly broad, radial pore-canals numerous. widened near their middle, no vestibules; muscle-scar with posterior row of four scars, a single kidney-shaped anterior scar in front and an oblique antero-ventral scar, with indistinct spot between anterior scar and uppermost scar of posterior row; hinge of the right valve with terminal, dental areas, with short anterior crenulate groove that merges into a crenulate bar in between.

Range : Oligocene to recent.

Cytheridea intermedia (REUSS).

Pl. IV, figs. 5-8.

Cytherina intermedia REUSS, 1850, vol. 3, p. 86, pl. 11, fig. 12.
Cytheridea mülleri (VON MÜNSTER) var. *intermedia* (REUSS), JONES, 1857, p. 42, pl. 5, fig. 4-5.

D i s t r i b u t i o n . — Belgium : Lower Ypresian (?) and Bartonian. England : Ledian to Bartonian.

R e m a r k s . — Both REUSS and JONES described this species from the Bartonian of Barton Cliff. It was found in great numbers in our material from this locality. Together with typical *C. intermedia* (see JONES) we found many valves that are very high and that are broadly rounded anteriorly and antero-ventrally. The right valves of this type have a pronounced concavity behind the middle of the ventral margin. This high form is much more frequent than the typical *Cytheridea intermedia.* In our opinion *C. intermedia* as figured by REUSS and JONES is the male of this species, whereas the high, rounded individuals are females. The latter resembles *Cytheridea ventricosa* GOERLICH (1953, p. 136, pl. 5, fig. 36-39) but they are different from this species by the straight ventral margin of the left valve and by the presence of many anterior marginal spines of various sizes.

Cytheridea pernota OERTLI and KEIJ.

Pl. III, figs. 22-26; Pl. IV, fig. 19.

Cytheridea mülleri (VON MÜNSTER) var. *acuminata* BOSQUET (pars), 1852, vol. 24, p. 39.
Cytheridea pernota OERTLI and KEIJ, 1955, p. 19, pl. 1, fig. 1-13, textfig. 2.

D i s t r i b u t i o n . — Belgium : Upper Tongrian of Tongeren (Beukenberg), Zammelen, Kortessem, Oude-Biezen, Henis and Kleine-Spouwen; Rupelian : Bilzen (Katteberg) and several hand-borings at Kleine-Spouwen and Berg. France : Oligocene of Jeurre, Etréchy and Auvers-Saint-Georges (Paris Basin); Miocene of Pont-Levoy. Switzerland : Rupelian and Chattian.

R e m a r k s . — BOSQUET described *Cytheridea mülleri* var. *acuminata* from the Miocene of the Vienna Basin and the Oligocene of Belgium. GOERLICH (1953, p. 132) correctly raised

this variety to specific rank, with a Miocene representative as type. Investigation of Oligocene and Miocene material showed that GOERLICH's species is probably restricted to the Miocene.

In BOSQUET's material of *Cytheridea mülleri* [mostly *Haplocytheridea helvetica* (LIENENKLAUS)] we observed many specimens of *C. pernota,* which species shows vague resemblance to *Cytheridea acuminata,* but which is different from this species in outline and ornamentation.

Cytheridea praesulcata LIENENKLAUS.

Pl. III, fig. 16; Pl. IV, figs. 3-4.

Cytheridea praesulcata LIENENKLAUS, 1905, p. 39, pl. 3, fig. 17.

Distribution. — Belgium : Upper Tongrian and Rupelian (Nucula-clay). Germany : Upper Oligocene of the Mayence Basin.

Genus CLITHROCYTHERIDEA STEPHENSON, 1936.

TYPE SPECIES **Cytheridea (?) garetti** HOWE and CHAMBERS, 1935.

Diagnosis. — Carapace elongate, ovate or trapezoid-shaped; surface finely or coarsely pitted, with large undulations or nodes, some-times with ridges; marginal area and muscle-scar as *Cytheridea;* hinge of the left valve with distinct median, crenulate bar and ovate, notched sockets at both ends.

Range : Cretaceous to recent.

Clithrocytheridea appendiculata APOSTOLESCU.

Pl. II, figs. 17-18; Pl. III, figs. 1-3.

Cytheridea mülleri BOSQUET (non VON MÜNSTER), 1852, p. 39.
Clithrocytheridea appendiculata APOSTOLESCU, 1955, p. 247, pl. 1, fig. 11-13.

Distribution. — France : Lutetian of the Paris Basin.

Remarks. — A single valve of this species was found in the collection BOSQUET (No. 18E), derived from the Lutetian of Chaumont or Ferme de l'Orme. Several other specimens were found in our samples from the Lutetian of Grignon.

Clithrocytheridea fornicata APOSTOLESCU.

Clithrocytheridea fornicata APOSTOLESCU, 1955, p. 246, pl. 1, fig. 16-17.

Distribution. — France : Lutetian of the Paris Basin.

Remarks. — We found this species in our Grignon material.

Clithrocytheridea lerichei n. sp.

Pl. III, figs. 4-7; Pl. IV, fig. 2.

Cytheridea papillosa (pars), BOSQUET, 1852, vol. 24, p. 42.

Etymology : Named after the late Prof. M. LERICHE, famous Belgian Tertiary stratigrapher.

Holotype : A left valve (coll. BOSQUET, No. 19*b*).

Paratypoids : 9 detached valves (id.).

Type-locality : The region between Parnes, Grignon and Courtagnon, France.

Type-level : Lutetian.

Distribution. — France : Lutetian of Chaméry, Châteaurouge, Courtagnon, Chaumont, Grignon, Parnes and Saint-Félix.

Diagnosis. — A species of the genus *Clithrocytheridea* with the following characteristics : surface irregularly undulating, with two inflated parts in the posterior half, a depression posteroventrally, and covered with widely scattered rounded depressions.

Description. — The anterior margin is broadly rounded. The ventral margin is concave. The backward sloping posterior margin is straight or slightly convex. The postero-ventral end of the valve is narrowly rounded.

The surface is irregularly undulating and covered with irregularly scattered rounded depressions. Along the anterior margin of the right valve there is a narrow, compressed zone. Both valves have two irregularly shaped inflated areas in their posterior part. In some cases these elevations are connected by a low rounded ridge; mostly they are separated from one another by a longitudinal, depressed area. Between the ventral elevation and the postero-ventral margin there is another depression in the surface.

The hinge and muscle-scar are as for the genus. The radial pore-canals are straight and closely spaced, some 30 along the anterior margin.

Dimensions. — Holotype (left valve) : L : 0,73, H : 0,35, $\frac{1}{2}$W : 0,15; paratypoid (right valve) : L : 0,70, H : 0,33, $\frac{1}{2}$W : 0,13.

Remarks. — *Clithrocytheridea lerichei* is different from the earlier described species of the genus by the inflations of the posterior part of the valve. It differs from *C. verrucosa* APOSTOLESCU (1955, p. 248, pl. 2, figs. 19, 20) in outline; the latter species has a protruding anterior cardinal angle and is pointed postero-ventrally. Moreover, it has a broad ridge parallel to the anterior outline, which ridge is absent in *C. lerichei*.

Clithrocytheridea verrucosa APOSTOLESCU.

Clithrocytheridea verrucosa APOSTOLESCU, 1955, p. 248, pl. 2, fig. 19-20.

Distribution. — Lutetian of Paris Basin, France.

Remarks. — We found one valve in our material of the Lutetian IV of Grignon.

Genus HAPLOCYTHERIDEA STEPHENSON, 1936.

TYPE SPECIES **Cytheridea montgomeryensis** HOWE and CHAMBERS, 1935.

Diagnosis. — Carapace elongate, subovate or subtriangular; surface smooth, pitted, often with plications or nodes; marginal area and muscle-scar as *Cytheridea;* hinge of the right valve with elongate, notched terminal dental areas and low crenulate bar in between.

Range : Cretaceous to recent.

Haplocytheridae curvata (LIENENKLAUS).

Pl. II, figs. 9-10; Pl. III, figs. 17-21.

Cytheridea curvata LIENENKLAUS, 1900, p. 528, pl. 21, fig. 2.

Distribution. — Belgium : Rupelian. Germany : Upper Oligocene.

Haplocytheridea hebertiana (BOSQUET).

Pl. II, figs. 7-8.

Bairdia hebertiana BOSQUET, 1852, vol. 24, p. 27, pl. 1, fig. 11.

Lectotype : A left valve (coll. BOSQUET, No. 11).

Paratypoids : 2 detached valves and parts of 2 others (coll. BOSQUET, No. 11).

Type-locality : Pisseloup or Guépelle, Paris Basin, France.

Type-level : Ledian.

Distribution. — Belgium : Upper Ypresian of Frasnes-lez-Buissenal; Lutetian of Saint-Job and Leopoldswijk (Brussels), Genappe, Braine-l'Alleud, Gobertange, Diegem; Ledian of Asse, Forest and Saint-Gilles (Brussels), Balegem, Bambrugge and Vlierzele and probable Ledian of the boring Heist-op-den-Berg; Bartonian of Heizel (Brussels), Oedelem and the borings Brussegem and Heist-op-den-Berg.

Diagnosis. — A species belonging to the genus *Haplocytheridea* with the following characteristics : carapace bean-shaped, surface covered with widely spaced, circular pits; postero-ventral end of the right valve compressed; with anterior vestibule.

Description. — Sexual dimorphism is distinct.

The dorsal margin of the left valve is evenly arched; the anterior margin is obliquely rounded and the ventral outline is almost straight; the posterior margin is obliquely rounded, somewhat drawn-out ventrally.

The right valve is much lower and both ends are more obliquely rounded than in the left valve. The single undamaged right valve present in the coll. BOSQUET has an envenly rounded dorsal margin. Those found in our material are generally more triangular, highest at the anterior cardinal angle and with a nearly straight dorsal margin.

The surface is covered with widely scattered, circular pits. The postero-ventral end of both valves is compressed, more strongly so in the right valve.

The anterior marginal area is broad. There is an anterior vestibule, the extent of which could not be established because of the bad state of preservation. It is likely to be large and deep. The selvage of the right valve is widely apart from the antero-ventral and posterior margins.

The hinge and muscle-scar are as for the genus

Dimensions. — Lecto-type (female left valve) : L : 0,70, H : 0,37, ½W : 0,21; paratypoid (male right valve) : L : 0,69, H : 0,34, ½W : 0,16.

Remarks. — This species shows affinities in outline and ornamentation to *Haplocytheridea punctatella* (Bosquet); it is different in the more evenly arched dorsal outline of the male right valve and the less broadly rounded posterior end of the female left valve.

Haplocytheridea heinzelini n. sp.

Pl. II, figs. 14-15; Pl. V, figs. 15-17.

Etymology : Named after Dr. J. de Heinzelin de Braucourt of the Royal Belgian Institute for Natural Sciences, Brussels.

Holotype : A left valve (S 1762).

Paratypoids : Some 45 detached valves and 10 complete carapaces (S 1763-1775).

Type-locality : Bambrugge (ZD), Belgium.

Type-level : Ledian.

Distribution. — Belgium : Ledian of Bambrugge, Forest (Brussels), Asse, Vlierzele, Balegem and Gent, probable Ledian of boring Heist-op-den-Berg; Bartonian of Heizel and the boring Brussegem.

Diagnosis. — A species belonging to the genus *Haplocytheridea* with the following characteristics : surface finely pitted; posterior margin of the left valve broadly rounded, that of the right valve obliquely rounded; anterior vestibule deep; selvage in right valve widely apart from antero-ventral margin.

Description. — The left valve is ovate, highest at the anterior cardinal angle. Its dorsal margin is slightly arched, the anterior margin is obliquely rounded, the ventral margin is slightly convex before the middle, the posterior margin broadly rounded. The right valve is obliquely triangular; its posterior margin is obliquely rounded.

The ventral part of the anterior margin of both valves is often fringed with some 8 to 10 low, rounded, marginal denticles. In one specimen another 5 very small marginal spines were observed along the postero-ventral margin of the right valve.

The surface is finely pitted.

The anterior marginal area is broad with some 20 radial pore-canals. They are simple and straight along the dorsal part of the anterior margin, and branching along its ventral part. Another 15, simple, radial pore-canals were observed along the ventral margin; a dozen more are situated along the postero-ventral margin. The selvage of the right valve is widely apart from the antero-ventral and postero-ventral margins. There is a deep, more or less triangular anterior vestibule.

The hinge of the right valve consists of two terminal dental areas, with a low crenulated ridge in between. The anterior dental area bears some seven teeth, the posterior one some six teeth.

Dimensions. — Holotype (male left valve) : L : 0,65, H : 0,33, $\frac{1}{2}$W : 0,18; paratypoid (right valve) : L : 0,61, H : 0,31, $\frac{1}{2}$W : 0,15.

Remarks. — *H. heinzelini* shows some resemblance in outline and ornamentation to *Clithrocytheridea grigsbyi* Howe and Chambers (1935, p. 15, pl. 1, figs. 2-3), but the carapace in our species is posteriorly more broadly rounded, while the dorsal part of the posterior margin of its left valve has a lesser slanting. It is different from the other Eocene species of *Haplocytheridea* in its finely pitted surface.

Haplocytheridea heizelensis n. sp.

Pl. V, figs. 18-20.

Holotype : A left valve (S 1776).

Paratypoids : Some 75 detached valves and 10 complete carapaces (S 1777-1790, 2702-2705, 2767).

Type-locality : Heizel (BS 1259) near Brussels, Belgium.

Type-level : Sands of Wemmel (= Bartonian).

Distribution. — Belgium : Ledian of Balegem and Forest (Brussels) and probable Ledian of the boring Heist-op-den-Berg; Bartonian of Heizel, Gent, Oedelem and the borings Brussegem and Heist-op-den-Berg. Netherlands : Bartonian of borings Almelo and Delden.

Diagnosis. — A species of the genus *Haplocytheridea* with the following characteristics : carapace highest at anterior cardinal angle; left valve with broadly rounded posterior end; right valve subtriangular; surface covered with coarse depressions.

Description. — Sexual dimorphism is distinct. The males are more elongate than the ovate females.

The dorsal margin of the left valve is straight and slopes backwards; the anterior end is obliquely rounded, the posterior end broadly rounded. The ventral margin of the female left valve is slightly convex, that of the male straight. The right valve is subtriangular, its dorsal margin straight and backwardly sloping, its anterior end obliquely rounded, its ventral margin straight to slightly convex and its posterior end narrowly rounded ventrally.

The surface is covered with irregularly scattered rounded depressions.

The marginal area is moderately broad. There is a deep, triangular anterior vestibule. The radial pore-canals are moderately numerous, generally simple and straight, but antero-ventrally branching or in bundles.

The hinge and muscle-scar are as for the genus.

Dimensions. — Holotype (female left valve) : L : 0,65, H : 0,38, $\frac{1}{2}$W : 0,22; male left valve of Oedelem : L : 0,74, H : 0,40, $\frac{1}{2}$W : 0,22.

Remarks. — This species has an almost identical outline with *Haplocytheridea heinzelini* n. sp., but it has a coarser ornamentation. It is different from *Haplocytheridea hebertiana* (Bosquet) in having the depressions more closely set, and by its more triangular outline.

Haplocytheridea helvetica (LIENENKLAUS).

Pl. III, figs. 27-30.

Cytheridea helvetica LIENENKLAUS, 1895, p. 144.
Cytheridea mülleri (VON MÜNSTER) var. *helvetica* LIENENKLAUS, LIENENKLAUS, 1896, vol. 22, p. 26, pl. 2, fig. 6.
Haplocytheridea helvetica (LIENENKLAUS), GOERLICH, 1953, vol. 34, p. 140, pl. 7, fig. 52-55.

Distribution. — Belgium : Tongrian-Rupelian. Netherlands : Upper Tongrian of Schin op Geul, Limburg. Germany : Oligocene. Switzerland : Rupelian-Chattian. France : Oligo-Miocene.

Remarks. — In our material two types of specimens occur together, one smooth and another nodose. All gradations between both types were found. The percentage of nodose specimens varies with the localities, with age and with sex. Males are always smooth, females are for 0-30 % nodose and immature specimens for 30-100 %. For establishing these percentages only specimens with distinct nodes were considered to be « nodose ». Nearly identical results were obtained for *Cyprideis* (*Goerlichia*) *williamsoniana* (BOSQUET) (see p. 71).

The average dimensions of the carapace show a rather wide variation, as may be seen from the following table.

In this table the mean length (Ml) and height (Mh) in mm are given of the right valves of *H. helvetica* of some Belgian Upper Tongrian localities.

	Tongeren			Oude-Biezen						Kleine-Spouwen			Oude-Biezen			
	TB 216			BZ 519			BZ 520			BZ 540			TG 228			
	Ml	Mh	N	Ml	Mh	N	Ml	Mh	N	Ml	Mh	N	Ml	Mh	N	Ml/Mh
♂	0,91–0,45		15	0,89–0,45		8	0,89–0,44		7	0,85–0,42		8	0,79–0,39		35	± 2,0
♀	0,80–0,44		61	0,77–0,42		21	0,80–0,42		21	0,76–0,41		15	0,70–0,38		19	± 1,8
mat.-1	0,61–0,36		29	0,64–0,36		9	0,64–0,37		11	0,57–0,34		4	0,58–0,34		1	± 1,7
mat.-2	—			—			—			0,46–0,27		1	—			—

N = number of specimens; mat.-1 = last-but-one moltstage.

Haplocytheridea henisensis KEIJ.

Pl. III, figs. 8-12; Pl. IV, figs. 9-11.

Haplocytheridea henisensis KEIJ, 1955, p. 25, pl. 1, fig. 17-22, text. fig. 1, 3.

Distribution. — Belgium : Upper-Tongrian of Tongeren-Henis, Oude-Biezen and Kleine-Spouwen. Some specimens were found in BOSQUET's material of the Tongrian and (or) Rupelian of Berg, Kleine-Spouwen, Leten, Oude-Biezen, Herderen, Borgloon (= Looz), Tongeren, Neerrepen and of Klimmen (Netherlands).

Remarks. — This species looks to be characteristic for the Oude-Biezen unit, and not for the Henis-unit as was abusively mentioned in 1955.

Haplocytheridea perforata (ROEMER).

Pl. IV, fig. 20.

Cytherina perforata ROEMER, 1838, p. 516, pl. 6, fig. 11.
Cytheridea incrassata BOSQUET, 1852, vol. 24, p. 44, pl. 3, fig. 11.
Cytheridea perforata (ROEMER), JONES, 1857, p. 44, pl. 4, fig. 14; LIENENKLAUS, 1894, vol. 46, p. 225, pl. 15, fig. 5; KUIPER, 1918, p. 33, pl. 1, fig. 11.
Haplocytheridea perforata (ROEMER), APOSTOLESCU, 1955, p. 248, pl. 2, fig. 21-24.

Distribution. — Belgium : Ypresian-Bartonian. Netherlands : Bartonian-Miocene (?). Germany : Oligo-Miocene. France : Lutetian-Ledian. England : Eo-Oligocene.

Remarks. — *Cytheridea incrassata* BOSQUET is in all features identical with *Haplocytheridea perforata* (ROEMER) as the latter is commonly interpreted. The ornamentation of the specimens in our material varies between fine and coarsely pitted.

Haplocytheridea punctatella (BOSQUET).

Pl. II, figs. 11-12; Pl. III, figs. 13-15.

Bairdia punctatella BOSQUET, 1852, vol. 24, p. 26, pl. 1, fig. 10.

Distribution. — Belgium : Rupelian (*Nucula comta*-clay) of Kleine-Spouwen and Berg.

Remarks. — The original material of the collection BOSQUET got lost. We found some specimens at Kleine-Spouwen which belong to this species. Mr. H. OERTLI (Berne) informed us (written communication) that he has material at his disposal from the Oligocene of Jeurre, France. BOSQUET reported this species to be rather common at Jeurre and Etréchy, and to be very rare in the Rupelian *Nucula*-clay of Berg near Kleine-Spouwen. So we had better leave it to Mr. OERTLI to designate the neotype from his French material, rather than basing it on the scarce material from the Belgian locality.

Postcript. — When the manuscript of this paper was in the press, we received the paper of Dr. H. J. OERTLI : Ostrakoden aus der oligozänen und miozänen Molasse der Schweiz. (Schweiz. Pal. Abh., bd. 74, 1956). In this paper OERTLI erected the new genus *Cyamocytheridea*, with *Bairdia punctatella* BOSQUET as the type species. It was not possible to bring our paper up to date with the results of OERTLI's investigations.

Haplocytheridea strigulosa (REUSS).

Pl. IV. figs. 12-14.

Cytherina strigulosa REUSS, 1850, vol. 3, p. 58, pl. 8, fig. 32, pl. 10, fig. 29.
Bairdia strigulosa (REUSS), BOSQUET, 1852, vol. 24, p. 25, pl. 1, fig. 9.
Haplocytheridea strigulosa (REUSS), KEIJ, 1955, vol. 21, n° 2, p. 112, pl. 15, fig. 7.

Distribution. — France : Aquitainian-Burdigalian of the Aquitaine Basin. Austria : Miocene. Italy : Pliocene ?

Haplocytheridea sp.

Pl. II, fig. 16.

Cytheridea mulleri, BOSQUET (non VON MÜNSTER), 1852, vol. 24, p. 39.

Distribution. — France : Lutetian of Chaumont and Ferme de l'Orme (coll. BOSQUET, No. 18E).

Remarks. — The number of the valves is too small to justify to erect a new species.

Genus AULOCYTHERIDEA HOWE, 1951.

TYPE SPECIES **Aulocytheridea margodentata** HOWE, 1951.

Diagnosis. — Carapace ovate to elongate; surface pitted, reticulate or with heavy ridges. Marginal area fairly broad, line of concrescence and inner margin coincide throughout, or slightly apart anteriorly. Radial pore-canals numerous. Hinge as in *Clithrocytheridea*. Muscle-scar as in *Cytheridea*.

Range : Eocene.

Aulocytheridea diegemensis n. sp.

Pl. IV, fig. 15; Pl. V, figs. 12-14.

Etymology : Named after the village of Diegem, Belgium.

Holotype : A left valve (S 1852).

Paratypoids : 45 detached valves and 2 complete carapaces (S 1853-1860).

Type-locality : Diegem (BC 117).

Type-level : Lutetian.

Distribution. — Belgium : Lutetian of Diegem, Forest and Saint-Job (Brussels), Spy and Braine-l'Alleud.

Diagnosis. — A species of the genus *Aulocytheridea* with the following characteristics : valves with both ends obliquely rounded, surface covered with small pits.

Description. — Sexual dimorphism is distinct. The female is high and thickset, the male more elongate.

The female left valve is broadly ovate, with short, arched, dorsal margin, obliquely rounded ends and an almost straight ventral outline. The right valve is more triangular; it has more narrowly rounded ends and a straight, obliquely placed dorsal margin.

The male left valve is lower and more elongate; it has a longer dorsal margin than the female. The right valve is also more elongate and lower than that of the female. Its dorsal margin is straight.

The antero-ventral margin of both valves and of both sexes is fringed with very low, rounded denticles.

The surface is covered with numerous shallow pits.

The marginal area is moderately broad, except antero-ventrally where it is really broad. There is a small, shallow anterior vestibule. The radial pore-canals are straight and numerous.

The hinge and the muscle-scar are as for the genus.

Dimensions. — Holotype (male left valve) : L : 0,60, H : 0,33, $\frac{1}{2}$W : 0,16; paratypoid (female left valve) : L : 0,57, H : 0,35, $\frac{1}{2}$W : 0,16.

Remarks. — In ornamentation this species resembles *Aulocytheridea punctatella* n. sp. and *Haplocytheridea heinzelini* n. sp.

A. punctatella is different by the almost parallel dorsal and ventral sides in the left valve and by the outwardly bulging antero-ventral border.

Aulocytheridea faboides (BOSQUET).

Pl. VI, figs. 1-2.

Cythere faboides BOSQUET, 1852, vol. 24, p. 56, pl. 2, fig. 8.
Clithrocytheridea faboides (BOSQUET), APOSTOLESCU, 1955, p. 246, pl. 1, fig. 14, 19.

Lectotype : A complete carapace (coll. BOSQUET, No. 23*b*).

Paratypoids : 4 detached valves (coll. BOSQUET, Nos. 23, 23*b*).

Type-locality : Saint-Josse-ten-Noode, suburb of Brussels, Belgium.

Type-level : Lutetian.

Distribution. — Belgium : Lower Ypresian of Rumbeke; Lutetian of Saint-Josse-ten-Noode, Forest, Leopoldswijk and Saint-Job (all suburbs of Brussels), Braine-l'Alleud, Spy, Gobertange, Genappe and Diegem; Ledian of Vlierzele, Forest and Saint-Gilles (Brussels), Balegem, Bambrugge and Asse, and probable Ledian of the boring Heist-op-den-Berg; Bartonian of Gent, Oedelen and borings Heist-op-den-Berg and Brussegem. France : Lutetian of Grignon and Ferme de l'Orme (coll. BOSQUET), Gomerfontaine, Vaudancourt, Parnes, Damery, Neauphlette, Montmirail, Villiers-Saint-Frédéric and Neauphle-le-Château. Netherlands : Bartonian of boring Delden.

Diagnosis. — A species of the genus *Aulocytheridea* with the following characteristics : anterior end obliquely rounded; posterior end broadly rounded; surface covered with irregularly placed depressions, tending to an arrangement in rows along the anterior, ventral and posterior margins.

Description. — Sexual dimorphism is distinct; the female carapaces are subtriangular, that of the males more elongate.

The dorsal margin is straight in the left valve and arched in the right one. The greatest height is at the anterior cardinal angle. The anterior margin is obliquely rounded. The ventral margin is slightly concave in the left valve, more strongly so in the right one. The posterior margin is broadly rounded.

The carapace is ovate in dorsal view. The left valve overlaps the right one along the dorsal part of the anterior margin.

The surface of juvenile specimens is faintly reticulated. The adults have more widely spaced, irregularly placed, rounded or elongate depressions. On the ventral side these depressions are more closely spaced, with a tendency to a linear arrangement. Some low ridges, parallel to the anterior margin were observed in a number of specimens. There is a rim along the rounded part of the anterior margin.

The marginal area is moderately broad; in its antero-ventral part there may be a very shallow vestibule. The anterior radial pore-canals are numerous some 30 to 40, closely set, simple and straight. The selvage of the right valve is very prominent in the posterior half of the valve. There is a rather broad postero-ventral flange in the right valve.

The hinge of the right valve consists of two terminal, elevated dental areas with a shallow indented groove in between. The left valve has a pronounced crenulated bar with terminal, notched sockets. Directly above the central part of the hinge, the dorsal surface of the valve is distinctly depressed.

The complete muscle-scar was not visible, only the posterior row of four scars.

Dimensions. — Lectotype (complete carapace) : L : 0,47, H : 0,28, W : 0,27.

Aulocytheridea mourloni n. sp.

Pl. IV, fig. 1; Pl. V, figs. 9-11.

Etymology : Named after the late Mr. M. Mourlon, distinguished Belgian geologist of the 19th century.

Holotype : A left valve (S 1882).

Paratypoids : 45 detached valves and 16 complete carapaces (S 1883-1899, 2708, 2900).

Type-locality : Balegem (ZG 1025), Belgium

Type-level : Ledian.

Distribution. — Belgium : Lutetian of Diegem, Gobertange and Godarville; Ledian of Baegem, Asse, Forest (Brussels), Bambrugge and Vlierzele, probable Ledian of the boring Heist-op-den-Berg; Bartonian of Gent, Oedelem and the borings Brussegem and Heist-op-den-Berg. Netherlands : Bartonian of boring Delden. France : Lutetian of Grignon.

Diagnosis. — A species of the genus *Aulocytheridea* with the following characteristics : outline trapezoid, surface with widely scattered, coarse pits; antero-ventral margin denticulate.

Description. — Sexual dimorphism is distinct. The female carapaces are short and thickset, those of the males are more slender.

The female left valve has a short, slightly oblique dorsal margin, an almost straight ventral margin, an obliquely rounded posterior end. The right valve has the shape of a trapezoid. The dorsal margin is straight and backward sloping. the ventral margin slightly concave, the anterior and posterior ends narrowly rounded.

The male left valve is more elongate and has a longer dorsal margin. The right valve is also more elongate than the female one.

The surface is covered with widely scattered, coarse pits. The antero-ventral margin bears a few, low and rounded denticles.

The marginal area is moderately broad. There is a small shallow anterior vestibule. The radial pore-canals are numerous and straight.

The hinge is as for the genus; the muscle-scar was not visible.

Dimensions. — Holotype (female left valve) : L : 0,49, H : 0,32, ½W : 0,17.

Remarks. — This species shows resemblance in outline and ornamentation to *Haplocytheridea hebertiana* (Bosquet), but it is shorter and it has a more trapezoid outline than the latter. It is different from *Aulocytheridea faboides* (Bosquet) in outline and ornamentation, the latter species being more elongate, more concave ventrally and with a coarser ornamentation.

Aulocytheridea punctatella n. sp.

Pl. IV, fig. 18; Pl. V, figs. 6-8.

Holotype : A left valve (S 1900).

Paratypoids : 20 detached valves and 6 complete carapaces (S 1901-1910, 2709, 2769).

Type-locality : Bambrugge (ZD 342), Belgium.

Type-level : Ledian.

Distribution. — Belgium : Ledian of Asse, Balegem, Bambrugge, Forest (Brussels) and Gent; Bartonian of Oedelem and borings Heist-op-den-Berg and Brussegem. Netherlands : Bartonian of borings Almelo and Delden.

Diagnosis. — A species of the genus *Aulocytheridea* with the following characteristics : surface covered by closely set, small, shallow depressions; anterior end drawn-out ventrally and fringed with low, rounded denticles.

Description. — Sexual dimorphism is pronounced. The male carapace is elongate, the female one is shorter and wider.

The dorsal margin of the male left valve is straight and slightly sloping backwards. The anterior end is drawn-out ventrally and fringed with a row of low, rounded marginal denticles. The ventral margin is almost straight. The posterior end is rounded. The right valve is highest at the anterior cardinal angle, the dorsal margin slopes more steeply backwards and the posterior end is narrowly rounded ventrally.

The female left valve has a short, slightly arched dorsal margin and a straight ventral one. The anterior end is drawn-out ventrally and fringed with denticles, the posterior end is rounded. The right valve is just as that of the male, but much shorter.

The surface is covered by numerous, closely set, shallow depressions. Parallel to the anterior margin there are a few low ridges.

The marginal area is broad; there is a small, shallow anterior vestibule. The radial pore-canals are numerous, straight and somewhat widened in the middle. The hinge is as for the genus.

Dimensions. — Holotype (female left valve) : L : 0,49, H : 0,30, ½W : 0,15; male left valve : L : 0,55, H : 0,29, ½W : 0,15.

Remarks. — This species resembles *Haplocytheridea heinzelini* n. sp. in its ornamentation, but the latter is longer and has not a drawn-out antero-ventral end. They occur together in several samples.

Aulocytheridea tavernieri n. sp.

Pl. VI, fig. 3.

Etymology : Named after Prof. Dr. R. Tavernier, Geology Professor of the University of Gent.

Holotype : A right valve (S 1911).

Paratypoids : 11 detached valves and one complete carapace (S 1912-1917, 2014, 2710).

Type-locality : Forest (BD 1256), at the corner of the avenue Minerve and the avenue du Domaine, Brussels, Belgium.

Type-level : Ledian.

Distribution. — Belgium : Ledian of Forest and Balegem and probable Ledian of the boring Heist-op-den-Berg; Bartonian of Oedelem, Heizel and the borings Heist-op-den-Berg and Brussegem. Netherlands : Bartonian of boring Delden.

Diagnosis. — A species belonging to the genus *Aulocytheridea* with the following characteristics : carapace small and ovate; ornamented with heavy, rounded ridges, among which vertical ones are dominating dorsally, and horizontal ones ventrally.

Description. — The dorsal margin of the left valve is straight; the cardinal angles are marked. Its posterior end is broadly rounded. In the right valve the arched dorsal margin merges gradually into the obliquely rounded posterior margin. The anterior cardinal angle is marked here, being the highest point of the valve. The anterior margin is obliquely rounded, being more oblique in the right valve than in the left one. The ventral margin of the left valve is almost straight; strongly concave in the right one.

The surface is ornamented with broad, rounded ridges. Dorsally vertical ridges are dominant, in the ventral half of the valve a horizontal direction dominates among them.

The entire marginal area is moderately broad. Numerous closely-set straight radial pore-canals were observed along the anterior, ventral and posterior margins. The selvage of the right valve is very high posteriorly. In the right valve there is a rather broad flange along the anterior, postero-ventral and posterior margins.

The hinge of the right valve consists of two terminal dental areas, each consisting of some five cusps, with an indented groove in between. The hinge of the left valve is the complement.

Dimensions. — Holotype (right valve) : L : 0,41, H : 0,24, $\frac{1}{2}$W : 0,12.

Remarks. — The ornamentation of this species somewhat resembles that found in Ruggieri's subgenus *Callistocythere* of the genus *Leptocythere*. On the other hand, however, outline, and alle internal features point to *Aulocytheridea*.

Genus CYPRIDEIS JONES, 1857.

TYPE SPECIES **Candona torosa** JONES, 1850.

Diagnosis. — Carapace broadly ovate, left valve larger than the right one. Surface smooth, pitted, often with large nodes. Marginal area fairly narrow. Muscle-scar with posterior, vertical row of four scars with a single kidney-shaped scar in front, and an elongate scar antero-ventrally. Sexual dimorphism pronounced.

Range : Eocene to recent.

Subgenus CYPRIDEIS JONES, 1857.

Diagnosis. — Radial pore-canals fairly numerous, short and bulbous. Hinge of the right valve with long anterior dental area of some fifteen teeth, a postjacent short, deep, notched groove merging into a low crenulate bar, and a posterior dental area of some six teeth.

Range : Miocene to recent.

Subgenus GOERLICHIA n. subgen.

TYPE SPECIES **Cytheridea williamsoniana** BOSQUET, 1852.

Etymology : Named after Dr. F. GOERLICH, Bentheim, Germany.

Diagnosis. — A subgenus of the genus *Cyprideis* with the following characteristics : median hinge-element of the left valve a prominent crenulate bar; marginal area rather narrow; radial pore-canals short, straight and widely spaced.

Description. — The sexual dimorphism is very pronounced. The females are strongly swollen posteriorly, while the males have their greatest width in the middle.

The outline is bean-shaped or broadly ovate. The left valve overlaps the right one along the entire margin, except in the middle of the dorsal margin.

The surface is smooth or punctate, sometimes with grooves in the antero-dorsal region. Nodes may be present.

The marginal area is rather narrow. The line of concrescence coincides with the inner margin throughout. The radial pore-canals are widely spaced, short, straight and simple. Their basal part may be widened.

The central muscle-scar consists of a vertical row of four elongate scars, and two rounded scars that lie in front of the uppermost one of the vertical row. At least seven more small and rounded scars are situated between the central scar and the hinge-line. An obliquely placed, elongate scar lies antero-ventrally of the central scar and a small rounded scar near the ventral line of concrescence.

The hinge of the right valve consists of two, terminal cusped dental areas, the anterior one being very long, and a crenulated groove in between. The median hinge-element of the left valve is a pronounced crenulated bar.

Range : Eocene to Miocene.

Remarks. — The new subgenus *Goerlichia* is in most features identical with the nominate subgenus *Cyprideis* (see for redefinition : GOERLICH, 1952), such as outline, ornamentation, muscle-scar and by the absence of a vestibulum. It differs in hinge-pattern and in the structure of the radial pore-canals. *Cyprideis* has but a very short crenulated bar just behind the anterior socket of the left valve's hinge, whereas in *Goerlichia* this ridge forms the entire median hinge element. The radial pore-canals of *Cyprideis* are bulbous and closely-set, rarely bifurcating; in *Goerlichia* they are not bulbous, but thin simple and widely spaced.

Cyprideis (Goerlichia) williamsoniana (BOSQUET).

Pl. VII, figs. 6-8; Pl. XVIII, figs. 18-20.

Cytheridea williamsoniana BOSQUET, 1852, vol. 24, p. 43, pl. 2, fig. 6.

Lectotype : A left valve (coll. BOSQUET, No. 20).

Paratypoids : 43 detached valves (coll. BOSQUET, No. 20).

Locus-typicus restrictus : Kleine-Spouwen, Belgium.

Type-level : Upper Tongrian sands and marls of Oude-Biezen.

Distribution. — Belgium : Upper Tongrian of Oude-Biezen, Kleine-Spouwen and Berg; Rupelian (*Nucula*-clay) of Kleine-Spouwen and Katteberg near Bilzen. The specimens in the collection BOSQUET are mixed Tongrian and Rupelian individuals from Kleine-Spouwen, Berg, Borgloon (= Looz), Oude-Biezen (Vieux-Joncs), Herderen in Belgium and Klimmen in the Netherlands.

Diagnosis. — A species belonging to the subgenus *Goerlichia* with the following characteristics : surface finely pitted or smooth; carapace with greatest height at posterior cardinal angle.

Description. — The sexual dimorphism is pronounced; the females are strongly swollen posteriorly, while the males have an evenly sloping surface in this part of the valve.

The dorsal margin ranges from almost straight to evenly arched or slightly undulating. The posterior cardinal angle protudes more or less. The anterior margin is broadly rounded, with a straight part near the anterior cardinal angle. The ventral margin is slightly concave before the middle. The posterior margin is broadly rounded. The greatest height of the valve is at the posterior cardinal angle.

The male carapace is elliptical in dorsal view. The female carapace is wedge-shaped, with the greatest width beneath the posterior cardinal angle.

The surface is covered with numerous, closely-set pits or it is smooth. Both in BOSQUET's material as well as in ours, many nodose specimens were observed. In our material of the *Nucula*-clay one out of 40 specimens is without these nodes. The nodosity consists of single scattered nodes and nodes bearing a number of solid globules or outgrowths resembling a bunch of grapes.

The marginal area is rather narrow and pierced anteriorly by some 20 short, simple and straight radial pore-canals. Identical numbers of them are situated along the ventral margin as well as along the posterior margin. The line of concrescence coincides with the inner margin throughout.

The muscle-scar and hinge-pattern are as for the genus.

Dimensions. — Lecto-type (male left valve) : L : 0,88, H : 0,52, ½W : 0,21; Paratypoid (female left valve) : L : 0,84, H : 0,51, ½W : 0,24.

Remarks. — *Cyprideis* (*Goerlichia*) *williamsoniana* differs from the Eocene *C.* (*G*) *postolescui* n. sp. in its generally pitted surface and in having a straight hinge bar instead of a curved one.

Length and height of all available specimens (some 90) were measured. Although coming from several localities, that range in age from Upper Tongrian to Rupelian (*Nucula*-clay), these individuals show but little variation. When plotted in a scatterdiagram, four clusters appear, two for the adult males and females respectively and two for earlier molts (of immature specimens). A single specimen of the last-but-three molt stage was found. Nearly all available mature specimens come from the collection Bosquet; two others come from a sample of the Tongrian, none was found among the Rupelian individuals of our material.

Nearly all immature specimens (47 out of 48) are covered with nodes. 13 of the 26 mature females are nodose, whereas all 16 adult males are smooth (see table). It may be emphasized that similar observations were made with *Haplocytheridea helvetica* (Lienenklaus) (see p. 62).

	♂		♀		Last-but-one moltstage		Last-but-two moltstage		Last-but-three moltstage		
	N	N′	N	N′	N	N′	N	N′	N	N′	
Coll. Bosquet	16	—	24	11	3	3	—	—	—	—	Tongrian + Rupelian
BZ 520	—	—	2	2	2	2	1	1	—	—	Tongrian
BZ 540	—	—	—	—	—	—	2	2	—	—	Tongrian
BZ 485	—	—	—	—	10	10	5	5	—	—	Rupelian
BZ 486	—	—	—	—	9	9	6	6	—	—	Rupelian
BZ 490	—	—	—	—	—	—	1	1	—	—	Rupelian
BZ 493	—	—	—	—	2	2	2	2	—	—	Rupelian
TE 224	—	—	—	—	2	1	—	—	—	—	Rupelian
TE 428	—	—	—	—	—	—	1	1	—	—	Rupelian
TK 524	—	—	—	—	—	—	1	1	1	1	Rupelian

N = total number of valves; N′ = number of nodose valves.

Triebel (1941, p. 324) suggested that the development of nodes in representatives of species with otherwise even surface, depended on environment. It would be correlated with decrease of salinity, and consequently with decrease of density of the water. This assumption is corroborated by Van den Bold's observations that in the region of the Dutch N.E. Polder of the former Zuyderzee, the percentage of tuberculate specimens of recent *Cyprideis littoralis* (Brady) increases with decreasing salinity.

The Belgian Upper Tongrian deposits are considered to be of brackish water origin, but the environment in which the Rupelian *Nucula comta*-clay was deposited, is thought to have been marine. In the latter sediments nodose specimens of *C. (G) williamsoniana* do occur, but immature individuals only.

The mean length/height ratio, computed from this mixed material are : adult male : 1.70; adult female : 1,65; last-but-one molt : 1,60; last-but-two molt : 1,55.

Cyprideis (Goerlichia) apostolescui n. sp.

Pl. VII, figs. 9-15.

Cytheridea williamsoniana (pars), BOSQUET, 1852, vol. 24, p. 43.

Etymology : Named after Mr. V. APOSTOLESCU, Institut français de Pétrole, France.

Holotype : A left valve (coll. BOSQUET, No. 20*b*).

Paratypoids : 11 detached valves (id.).

Type-locality : Saint-Félix or Hermonville, Paris Basin, France.

Type-level : Lutetian.

Diagnosis. — A species belonging to the subgenus *Goerlichia* with the following characteristics : carapace with the greatest height behind the middle; surface smooth, with very shallow furrow antero-dorsally.

Description. — Sexual dimorphism pronounced. The females are strongly swollen posteriorly, while the males have an evenly sloping surface in the posterior part of the valves.

The dorsal margin of the right valve is arched, that of the left valve almost straight or slightly undulating. The posterior cardinal angle of the left valve protrudes. The anterior margin of both valves is broadly rounded; the ventral margin is straight or slightly arched and the posterior margin again broadly rounded.

The surface is smooth and shiny, with some 50 widely scattered normal pore-canals. There is a short, shallow furrow running downwards from a point behind the anterior cardinal angle. Some valves were observed which have a few solid, globular outgrowths, widely scattered over the surface.

The anterior marginal area is moderately broad and transversed by some 18 short, straight, widely spaced radial pore-canals.

The muscle-scar and the hinge are as for the genus. The crenulated bar of the left valve and the complementary groove of the right valve are somewhat curved.

Dimensions. — Holotype (female left valve) : L : 0,86, H : 0,53, $\frac{1}{2}$W : 0,30; paratypoid (male left valve) : L : 0,82, H : 0,48, $\frac{1}{2}$W : 0,24.

Remarks. — *Cyprideis (Goerlichia) apostolescui* differs from *C. (G) williamsoniana* (BOSQUET) in having a curved hinge bar instead of a straight one, and in having a smooth surface instead of a pitted one.

Genus CYTHERISSA SARS, 1925.

TYPE SPECIES **Cythere lacustris** SARS, 1863.

Diagnosis. — Carapace oval to subtriangular, with upturned posterior end; surface pitted, faintly reticulate, often with large nodes; marginal area narrow, radial pore-canals fairly numerous, in groups; hinge indistinct, consisting of elongate, smooth, terminal elevations in the right valve.

Range : Oligocene to recent.

Cytherissa spathacea (LIENENKLAUS).

Pl. II, figs. 19-20.

Cytheridea spathacea LIENENKLAUS, 1905, p. 46, pl. 4, fig. 23.

Distribution. — Belgium : Upper Tongrian of Kleine-Spouwen. Germany : Oligocene *Cyrena*-marls of the Mayence Basin.

Remarks. — Our individuals fairly well resemble LIENENKLAUS' species. For generic determination we sent our material to Mr. C. W. WAGNER (The Hague) specialist in Holocene Ostracoda. Mr. WAGNER informed us (written communication) that the Belgian specimens very probably belong to the genus *Cytherissa*. The outline, the almost imperceptible hinge, the arrangement of the radial pore-canals and the presence of normal pore-canals of the sieve-type point to this genus. Our individuals are probably juveniles, since they lack the arrangement of the radial pore-canals in groups of four, which is a typical feature of adult representatives of species of the genus *Cytherissa*.

Cytherissa is confined to fresh and perhaps to slightly brackish water environments.

Genus PARACYPRIDEIS KLIE, 1929.

TYPE SPECIES **Cytheridea fennica** HIRSCHMANN, 1909.

Diagnosis. — Carapace elongate to subtriangular, often with postero-ventral spur; surface smooth or with widely scattered pits; left valve larger than the right one; marginal area rather narrow, anterior vestibule large, radial pore-canals of moderate number, straight and simple; normal pore-canals of sieve-type; hinge of the right valve with smooth, elongate, terminal dental elevations, and smooth groove in between; muscle-scar with posterior row of four scars, with two scars in front, a large scar antero-ventrally and another scar ventrally.

Range : Upper Cretaceous to recent.

Paracyprideis rarefistulosa (LIENENKLAUS).

Pl. VIII, figs 18-20.

Cytheridea rarefistulosa LIENENKLAUS, 1905, p. 41, pl. 3, fig. 18.

Paracyprideis rarefistulosa (LIENENKLAUS), TRIEBEL, 1941, vol. 23, p. 155, pl. 1, fig. 1-7, pl. 2, fig. 8-9; GOERLICH, 1953, vol 34, p. 145.

Distribution. — Belgium : Rupelian (*Nucula*-clay). Germany : Rupelian of the Mayence Basin, the region of Cassel, and Tölz a. Isar (Bavaria).

Genus CUNEOCYTHERE LIENENKLAUS, 1894.

TYPE SPECIES **Cuneocythere truncata** LIENENKLAUS, 1894.

Diagnosis. — Carapace ovate to egg-shaped, thick-shelled. In dorsal view posterior end more or less truncate. Left valve entirely overlapping the right valve. Surface pitted to coarsely reticulate. Marginal area broad, sometimes with shallow anterior vestibule. Radial pore-canals numerous, long and often curved. Central muscle-scar with posterior row of four scars and a single kidney-shaped one in front.

Range : Eocene-Miocene.

The genus *Monsmirabilia* was described by APOSTOLESCU (1955, p. 255) for three species of the Lutetian of the Paris Basin. With the genus *Cuneocythere* this genus is in all features identical, with the exception of some details of the hinge.

The Oligo-Miocene species of *Cuneocythere* have a very simple hingepattern, that consists of a long, smooth groove in the left valve into which fits the smooth bar of the right valve. This bar is slightly elevated at its anterior end. The groove of the left valve is somewhat broader and deeper at its anterior end, so as to fit this elevation. The bar which borders this groove at the ventral side bends around this depression. It was observed in *Cuneocythere marginata* (BOSQUET), that this bar often ends in small toothlike structure.

The hinge of *Monsmirabilia* shows the same basic pattern, but it differs in two details. The anterior tooth of the left valve is more distinct and an accomodation groove is present above the middle part of the left valve's hinge. This accomodation groove is well developed in *Cuneocythere subovata* (APOSTOLESCU), *C. oblonga* (APOSTOLESCU) and *C. foveolata* (BOSQUET), but very narrow in *Cuneocythere triebeli* n. sp., all four species from the Eocene.

We think it more justified to consider *Monsmirabilia* as a subgenus to *Cuneocythere*, rather than to give it generic rank.

As a consequence : the subgenus *Cuneocythere* is characterized by a simple groove and bar system, without accomodation groove in the left valve. A small anterior tooth-like structure may be present in the left valve.

Range : Oligo-Miocene.

The subgenus *Monsmirabilia* is characterized by the presence of a more ore less distinct accomodation groove and a distinct anterior tooth, both in the left valve.

Range : Eocene.

Subgenus CUNEOCYTHERE LIENENKLAUS, 1894.

TYPE SPECIES **Cuneocythere truncata** LIENENKLAUS, 1894.

Cuneocythere (Cuneocythere) lienenklausi n. sp.

Pl. IX, figs. 12-16.

Etymology : Named after the late Mr. E. LIENENKLAUS, German Ostracode specialist.

Holotype : A left valve (S 1994).

Paratypoids : 27 detached valves (S 1995-2003).

Type-locality : Kleine-Spouwen (TE 428), Belgium.

Type-level : *Nucula comta*-clay (= Rupelian).

Distribution. — Belgium : Rupelian (*Nucula*-clay) of Kleine-Spouwen and Berg, France : Oligocene of Jeurre, Paris Basin (coll. VAN RIEMSDIJK).

Diagnosis. — A species of the subgenus *Cuneocythere* with the following characteristics : Surface covered with delicate reticulation, except an almost smooth marginal zone. Anterior vestibule rather large.

Description. — Sexual dimorphism is well developed. The females are ovate, while the males are elongate with parallel dorsal and ventral margins. In dorsal view the females are widest near the posterior end; the males have almost parallel lateral sides.

The dorsal and ventral margins of the female left valve are convex. The anterior and posterior margins are broadly rounded. The female right valve is much lower and it has an arched dorsal margin and a straight ventral margin; its posterior margin is obliquely rounded.

The male valve has slightly convex dorsal and ventral margins. Both ends are broadly rounded.

In dorsal view the female carapace is wedge-shaped with truncate posterior end. It is widest near the posterior end. The male valve has almost parallel sides, with a tapering anterior end and a more truncate posterior end.

The surface is covered with a delicate reticulation. A zone along the margins is almost smooth.

The marginal area is broad along the anterior margin and rather narrow along the ventral and posterior margins. The anterior radial pore-canals are numerous, slightly curved and densely-set. Some 25 radial pore-canals are situated along the postero-ventral margin.

The muscle-scar consists of a posterior vertical row of four small, ovate scars. Anteriorly of this row there is a large scar, sometimes kidney-shaped. Above the central scar there are three more scars; antero-ventrally of it yet another.

The hinge of the left valve consists of a smooth groove, which deepens towards the ends. The right valve fits with its dorsal margin into this groove. Two elongate elevations of the dorsal margin fit into the deepened outer ends of the lefs valve's groove.

Dimensions. — Holotype (female left valve) : L : 0,69, H : 0,40, $\frac{1}{2}$W : 0,19.

Remarks. — This species resembles somewhat *Cuneocythere punctulata* LIENENKLAUS of the Rupelian of the Mayence Basin, but it differs in outline in the lateral and dorsal view.

Cuneocythere (Cuneocythere) marginata (BOSQUET)

Pl. IX, figs. 17-22.

Bairdia marginata BOSQUET, 1852, vol. 24, p. 28, pl. 1, fig. 12.
Cuneocythere truncata LIENENKLAUS, 1894, vol. 46, p. 260, pl. 18, fig. 6; 1900, vol. 52, p. 538; 1905, p. 48.
Cuneocythere praesulcata LIENENKLAUS, KUIPER (pars), 1918, pl. 3, fig. 33*a*.

Lectotype : A left valve (coll. BOSQUET, No. 12).

Paratypoids : Two complete carapaces and 75 single valves.

Type-locality : Berg, near Kleine-Spouwen, Belgium.

Type-level : *Nucula comta*-clay (= Rupelian).

Distribution. — Belgium : Rupelian (*Nucula*-clay) of Berg, Kleine-Spouwen and Bilzen-Katteberg, and Boom-clay at Tielrode. Netherlands : Rupelian. Germany : Rupelian of the Mayence Basin; Oligocene of north-western and central Germany.

Diagnosis. — A species of the subgenus *Cuneocythere* with the following characteristics : Anterior margin with marginal rim; surface coarsely reticulate.

Description. — Sexual dimorphism is marked. Males are lower and less wide than the females.

The dorsal margin of the valve is more or less convex. The greatest height is at the anterior cardinal angle. The anterior and posterior margins are broadly rounded in the left valve, and more narrowly rounded in the right one. The ventral margin of the female valve is straight; the males have a concavity in the middle.

The right valve is lower; its posterior end is drawn out ventrally.

The surface is covered with a coarse reticulation with two, more pronounced, concentric ridges parallel to the anterior margin. Along the anterior margin runs a marginal rim. Behind this rim lies a zone which is less conspicuously ornamented. Only small radial ridges connect the marginal rim with the concentric ridges. Most valves possess a very shallow, broad depressed area in the middle of the valve. The width of the valves diminishes rapidly towards the ventral and posterior margins.

The females are widest posteriorly. The males have almost parallel sides in dorsal view. Both sexes are truncate posteriorly, but the females more strongly so than the males.

The anterior marginal area is broad; it is narrower ventrally and posteriorly. Along the anterior margin some 45 curved, closely set, radial pore-canals were observed. All of them are broadened at the end. The same number of pore-canals is situated along the ventral and posterior margins. Along the ventral margin they are widely spaced.

The central muscle-scar consists of a short, vertical row of 4 small, ovate scars, with an elongate or kidney-shaped scar in front of them.

The hinge of the left valve consists of a smooth, curved groove between two smooth, rounded ridges. The groove is somewhat deeper at its anterior end. The lower ridge forms a knob-like elevation at its anterior end; it is also somewhat higher in its posterior part. The right valve fits with a rounded ridge in the groove of the left valve. An elongate, elevated part of this ridge fits in the anterior deeper part of this groove.

Dimensions. — Lectotype (female left valve) : L : 0,58, H : 0,36, $\frac{1}{2}$W : 0,21; paratypoids (female right valve) : L : 0,57, H : 0,31, $\frac{1}{2}$W : 0,14; (male complete carapace) : L : 0,59, H : 0,33, W : 0,22.

Remarks. — It is remarkable that the left valves, which are much larger than the right valves, are three times as numerous as the right valves. In our material of Berg (BZ) we found 27 left valves without a single right valve.

Cuneocythere truncata Lienenklaus is in our opinion synonymous with *C. marginata*. It has the same outline and ornamentation as *C. marginata*.

The valve figured under this name by Kuiper (fig. 33*a*) derived from the Middle Oligocene of boring Winterswijk (Netherlands) belongs to *C. marginata* (Bosquet).