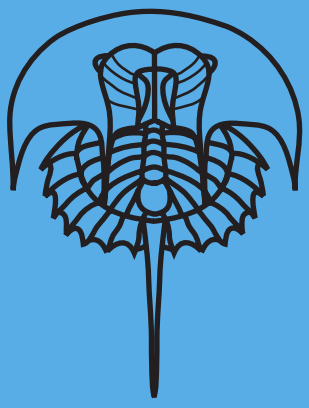

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PART F, REVISED, VOLUME 2, CHAPTER 13: SYSTEMATIC DESCRIPTIONS OF THE SCLERACTINIA FAMILY PACHYPHYLLIIDAE

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INTRODUCTION

The Pachyphylliidae is one of the smallest and least diverse scleractinian families. It consists of the three genera *Pachyphyllia* ALLOITEAU, 1957, *Columnocoenia* ALLOITEAU, 1952, and *Neocoeniopsis* ALLOITEAU, 1957. Thirty-four valid species pertain to this family, which consists of only fossil genera (BARON-SZABO, 2002, p. 41–42, p. 129–130; 2014, p. 30, p. 62; updated using Paleo-Database [paleodatabase.org]; May 2017). The majority of the pachyphylliid species (24) occurred during the Cretaceous. Eight species were reported from the Jurassic, and one species was found in the Paleocene. Two species occurred during both the Jurassic and the Cretaceous periods. Up to now, *Pachyphyllia* (two species) and *Neocoeniopsis* (six species) have been reported from a small number of mainly Upper Cretaceous localities. In contrast, the genus *Columnocoenia* (26 species) first occurred in the Middle Jurassic and was in worldwide distribution during some periods of the Lower Cretaceous. This chapter is organized in the following manner: the diagnosis of the family is followed by the description of its type genus and descriptions of the other genera are given in alphabetical order. Table 1 (p. 5) provides a synopsis of pachyphylliid genera, including a short characterization of the genera and stratigraphic ranges. Table 2 (p. 7) provides a comprehensive overview of the key characteristics of pachyphylliid genera.

Family PACHYPHYLLIIDAE M. Beauvais, 1982

[Pachyphylliidae M. BEAUVAIS, 1982, vol. II, p. 101]

Colonial, massive, subhemispherical, sublamellar, plocoid, cerio-plocoid, and submeandroid; colonies form by various forms of extracalicular and intracalicular budding, including marginal types and transverse division; costosepta compact, radially and bilaterally arranged, septal upper margins beaded; septal flanks irregularly covered by short spines and granules—often less than 50 µm tall; shapes include rounded granules, short thorns, and carinae-like forms; centers of calcification forming mid-septal lines irregularly present or absent; costae well developed; columella trabecular in varying shapes, including spongy, papillose, lamellar, and irregularly trabecular; synapticulae sparse, occurrence being observed throughout the corallum or restricted to wall; endothecal dissepiments vesicular or subtabular, sparse or abundant; peritheca present, well developed; paliform structures absent or present; trabeculae arranged in alternating, zigzag fashion; wall parasynapticulothecal with or without both pores and septothecal thickenings (new). [For alternating, zigzag trabeculae arrangement, see ALLOITEAU, 1957, p. 126.] *Middle Jurassic (Bajocian)–Paleocene*.

Pachyphyllia ALLOITEAU, 1957, p. 126 [**Phyllocoenia toucasi* DE FROMENTEL, 1884, p. 549; OD; holotype, MNHN R.10947]. Colonial, massive, subhemispherical, sublamellar, plocoid, corallites circular

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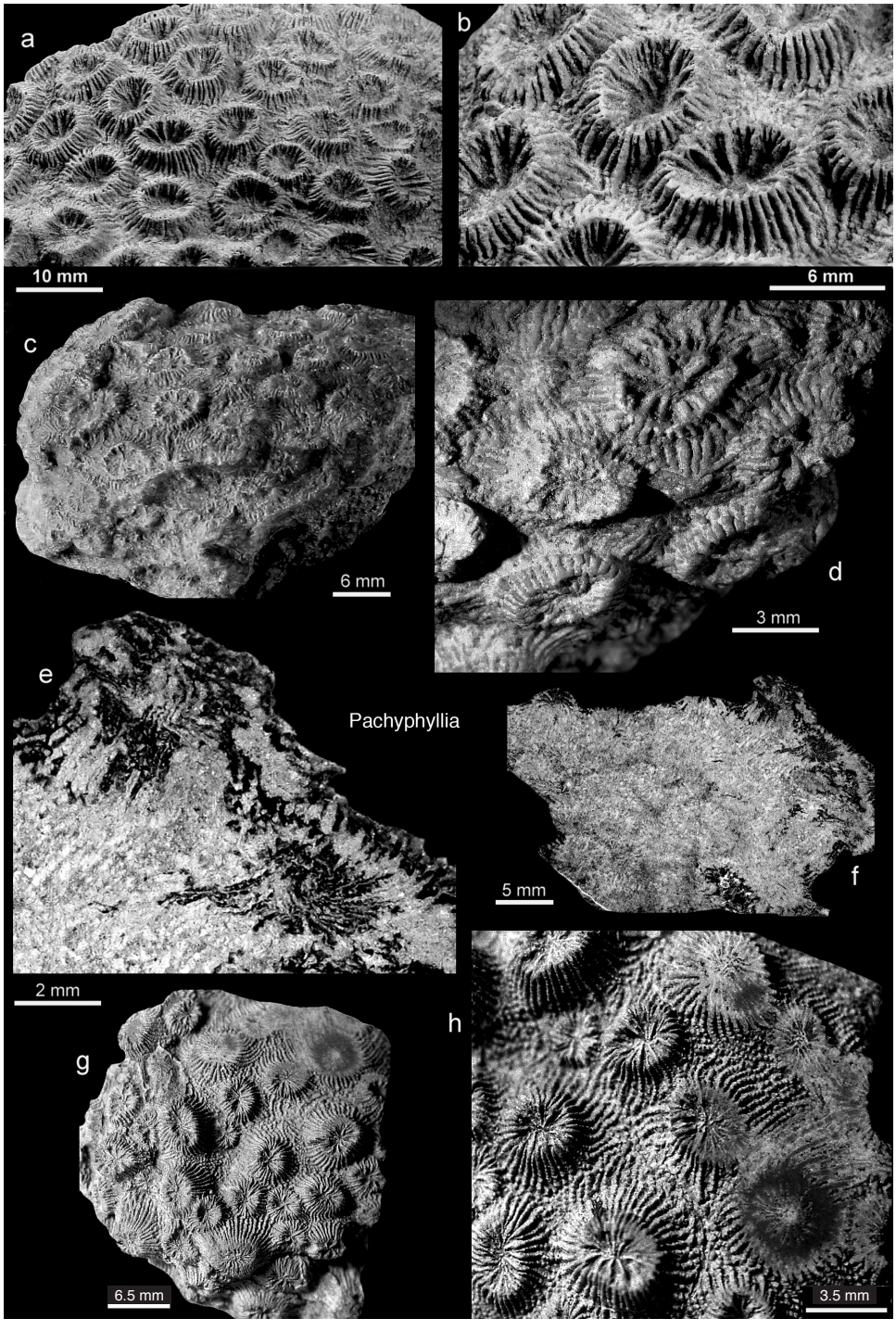

FIG. 1. Pachyphylliidae (p. 1–3).

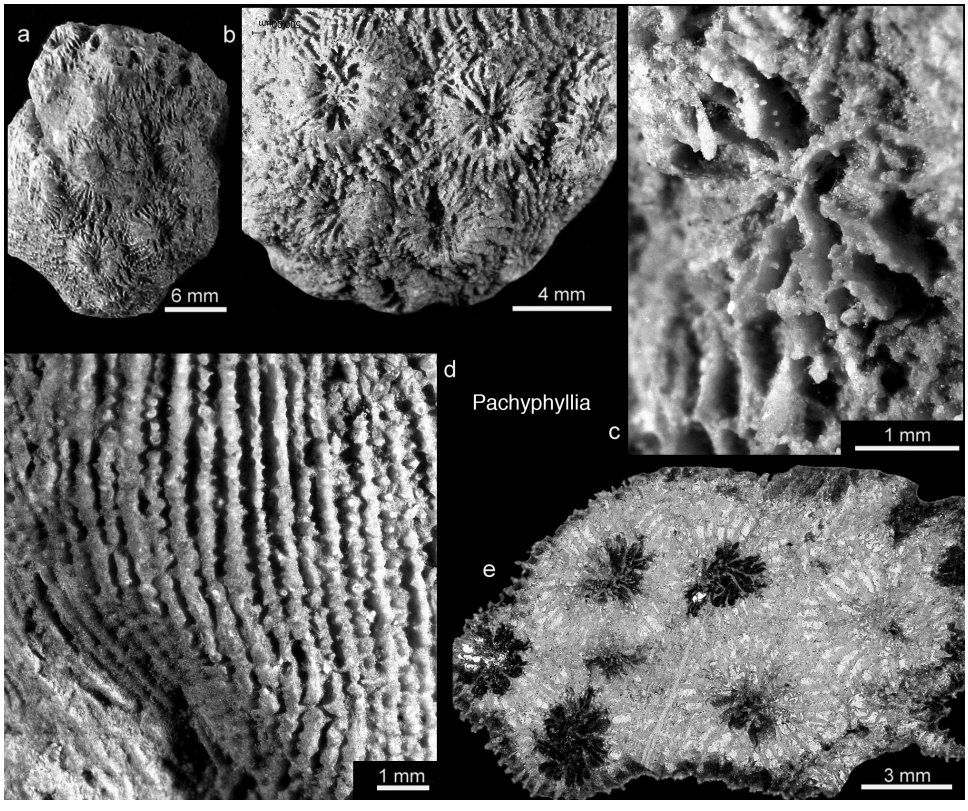

FIG. 2. Pachyphylliidae (p. 1–3).

or irregularly elliptical in outline, projecting or flat; costosepta compact, non-confluent to subconfluent, with upper margins beaded, arranged radially or bilaterally; longest septa generally reach axial part of corallite and fuse with columella; septal flanks irregularly covered by short spines and granules, often less than 50 µm tall; shapes include rounded granules, short thorns, and carinae-like forms when seen in cross view; budding extracalicular and marginal; columella lamellar or of irregularly shaped segments, sometimes indistinguishable from paliform structures; paliform structures present or absent; synapticulae sparse; peritheca vesicular; wall parasynapticulothecal, septothecal in places (new). [Because the species *Phyllocoenia nannodes* FELIX, 1891, from the Barremian of Mexico, recently grouped with *Pachyphyllia* (see LÖSER, 2006, p. 37), has both unknown columellar and endothecal structures and, in addition, differs from *Pachyphyllia* in having a parathecal wall, it is excluded from the list of occurrences.] *Upper Cretaceous (Turonian–Campanian):* western Europe, *Turonian–Santonian;* eastern and southern Europe, *Campanian*.——FIG. 1,*a–h. *P. toucasi* (DE FROMENTEL, 1884); *a–b,* holotype, MNHN R.10947, Santonian, France (Le Beausset, Var); *a,* upper surface of colony; *b,* close-up of *a*; *c–f,* NHMW 1913/0003/0049b, Coniacian–Santonian (Emscher Formation), France (Bouches-du-Rhône); *c,* upper surface of colony; *d,* close-up of *c; e,* oblique cross view of corallites, thin section, close-up of *f; f,* calicular view of colony, thin section; *g–h,* topotype, MNHN R.10925, Santonian, France (Le Beausset, Var); *g,* upper surface of colony; *h,* close-up of *a* (*a–b,* new, courtesy of J.-P. Cuif, Paris; *c–d,* new; *e–f,* new, courtesy of Michael Ricker, Senckenberg, Frankfurt; *g–h,* new).——FIG. 2,*a–e. *P. toucasi* (DE FROMENTEL, 1884), NHMW 1913/0003/0049a, Coniacian–Santonian (Emscher Formation), France (Bouches-du-Rhône); *a,* upper surface of corallum; *b,* close-up of *a; c,* close-up of *a,* showing septal granulation; *d,* lateral view of corallum; *e,* cross view of corallites, thin section (*a–d,* new; *e,* new, courtesy of Michael Ricker, Senckenberg, Frankfurt).

Columnocoenia ALLOITEAU, 1952, p. 626 [**C. lamberti* ALLOITEAU, 1957, p. 135; SD; holotype, MNHM R.10974] [=*Columnnocaenia* ALLOITEAU, 1957, p. 134, unjustified emendation under the provisions of ICZN, 1999, Article 33.2.3; =*Columnocaeniopsis* REIG ORIOL, 1989, p. 28 (type, *C. eduardi,* OD); =*Eocolumastrea* LÖSER & ZELL,

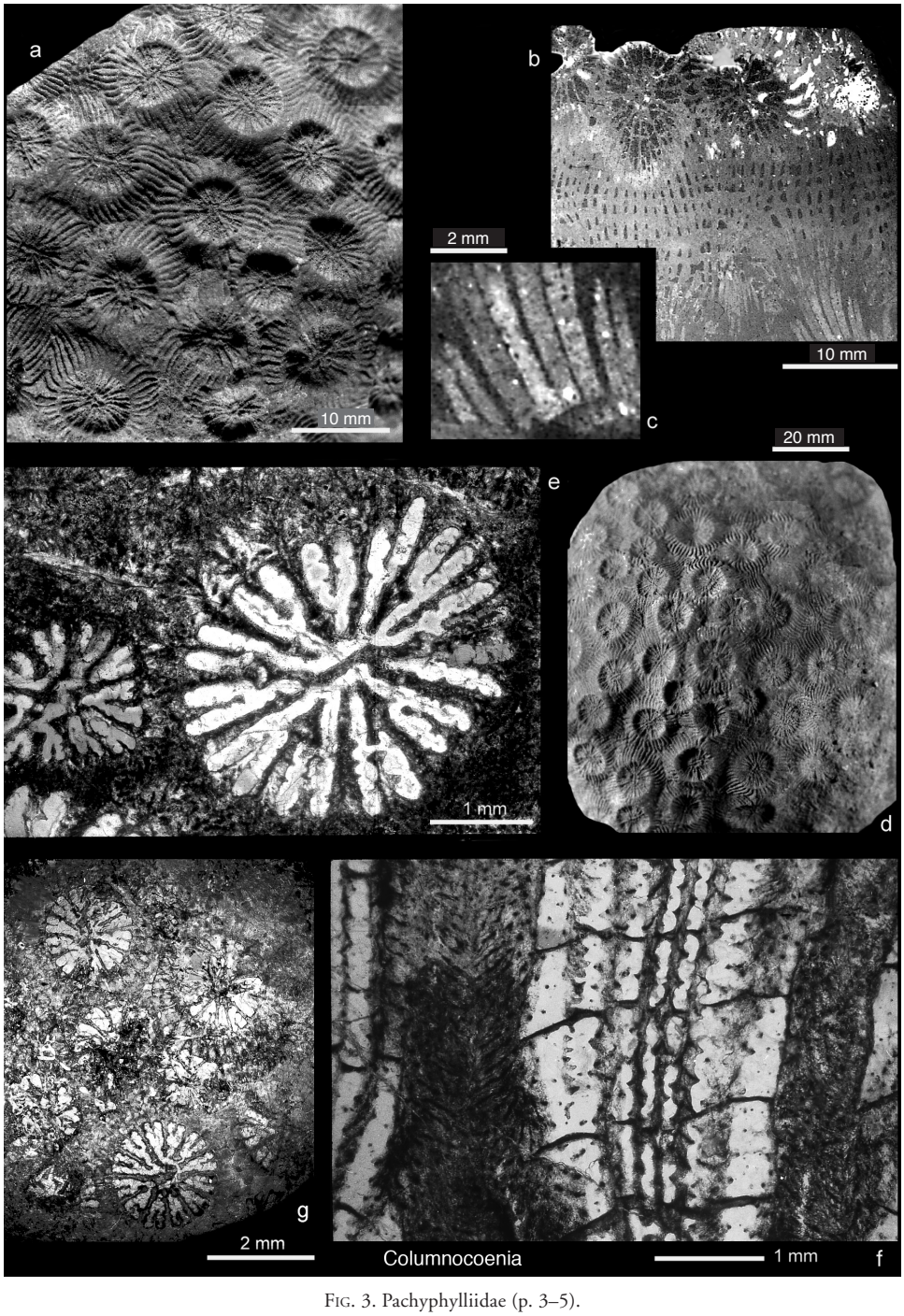

FIG. 3. Pachyphylliidae (p. 3–5).

TABLE 1. Synopsis of pachyphylliid genera, including key characteristics and stratigraphic ranges.

Pachyphylliid genera	Key characteristics	Stratigraphic ranges	Remarks
Pachyphyllia Alloiteau, 1957, p. 126 [**Phyllocoenia toucasi* De Fromentel, 1884, p. 549; OD]	Colonial; plocoid; budding extracalicular and marginal; columella lamellar or of irregularly shaped segments, sometimes indistinguishable from paliform structures; paliform structures absent or present; synapticulae sparse, mainly restricted to wall	Santonian–Campanian	This genus has the smallest stratigraphic range of the pachyphylliid genera
Columnocoenia Alloiteau, 1952, p. 626 [**C. lamberti* Alloiteau, 1957, p. 135; SD]	Colonial; plocoid, budding mainly extracalicular, or by various intracalicular types; columella lamellar or of irregularly shaped segments; paliform structures before 1st and 2nd septal size orders irregularly present; synapticulae sparse, mainly restricted to wall	Bajocian–Danian	This genus has the largest stratigraphic range of the pachyphylliid genera; contains the junior synonyms *Columnocaeniopsis* Reig Oriol, 1989, and *Eocolumastrea* Löser & Zell, 2015; Morycowa (1971) and Baron-Szabo (2014) provided additional information on the genus
Neocoeniopsis Alloiteau, 1957, p. 127 [**Phyllocoenia excelsa* De Fromentel, 1884, p. 559; OD]	Colonial; plocoid, cerio-plocoid, submeandroid; budding extra- and intracalicular; paliform structures present or absent; columella spongy-papillose or irregularly shaped; synapticulae present throughout corallum, sparse	Aptian, Turonian–Campanian	This genus has the largest range of polyp integration types of the pachyphylliid genera

2015, p. 159 (type, *Columnocoenia ksiazkiewiczi bucovinensis* MORYCOWA, 1971, p. 96; elevated to species level by BARON-SZABO & GONZÁLEZ-LEÓN, 1999, p. 473]. Colonial, massive, subhemispherical, plocoid; budding mainly extracalicular, sometimes by various kinds of intracalicular budding (such as the fission); costosepta compact, mainly non-confluent to sub-confluent, arranged radially or irregularly radially-bilaterally; development of granules on septal flanks by divergent trabeculae; columella generally lamellar, or rarely of small number of irregularly shaped segments; endothecal dissepiments thin, sparse, vesicular to subtabular; paliform structures before first and second septal size orders irregularly present; wall parasynapticulothecal, with pores in places; septothecal thickening present or absent; costae connected by dissepiments and sparsely occurring synapticulae. [This genus is best described by ALLOITEAU (1957, p. 135–136) and BARON-SZABO (2014, p. 30). The species *Placocoeniopsis katzi* KUZMICHEVA, 1975, from the Danian of Crimea (Ukraine) is grouped with *Columnocoenia* (see BARON-SZABO, 2006, p. 51). Development of granules on septal flanks by divergent trabeculae is best described by MORYCOWA (1971, p. 95–98).] *Jurassic (Bajocian)–Paleocene (Danian):* western Europe, *Bajocian, Oxfordian–Kimmeridgian;* West Asia, *Callovian–Oxfordian;* Southeast Asia, *Upper Jurassic;* sub-Saharan Africa, *Oxfordian;* western Europe, *Berriasian;* eastern Europe, *Valanginian–Hauterivian;* South America, *Hauterivian;* cosmopolitan, *Barremian–Aptian;* South Asia and southern Europe, *Albian;* Central America, southern Europe, and West Asia, *Cenomanian;* western Europe, *Cenomanian–Santonian;* southern Europe, *Santonian–Campanian;* eastern Europe, *Campanian;* eastern Europe, *Paleocene (Danian).*——FIG. 3,*a–d.* **C. lamberti* ALLOITEAU, 1957, holotype, MNHM R.10974, upper Santonian, France (Les Corbières, Aude); *a,* calicular view, close-up of *d; b,* oblique view of part of colony, thin section; *c,* close-up of *b,* partially showing dark zigzag lines; *d,* upper surface of colony (*a–d,* new).——FIG. 3, *e–f. C. ksiazkiewiczi* MORYCOWA, 1964, holotype, UJ 124 LX, ?Hauterivian–Barremian, Poland; *e,* cross view of corallites, thin section; *f,* lateral view of corallites, thin section (*e–f,* new).——FIG. *3.g. C. bucovinensis* MORYCOWA, 1971, holotype, UJ 124 115, cross view of corallites, thin section, lower Aptian, Romania (new).

Neocoeniopsis ALLOITEAU, 1957, p. 127 [**Phyllocoenia excelsa* DE FROMENTEL, 1884, p. 559; OD; syntypes, MNHN A29626, M03760, M03769, M03773] [=*Phyllocaeniina* VIDAL, 1980, p. 38 (type, *P. simonyi,* OD)]. Colonial, massive, subhemispherical, plocoid, cerio-plocoid, submeandroid; budding extracalicular and intracalicular; corallites

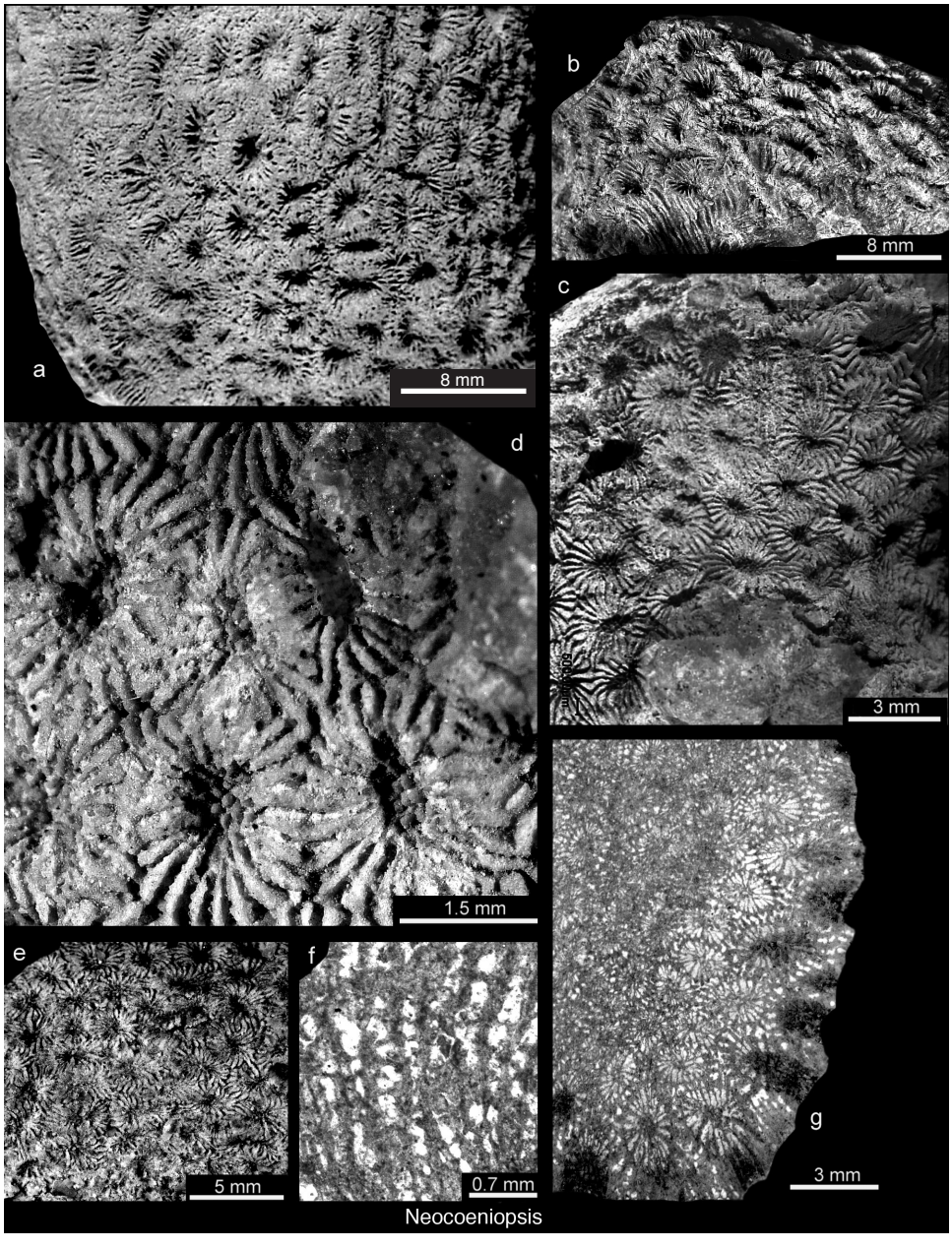

FIG. 4. Pachyphylliidae (p. 5–7).

circular or subpolygonal in outline, or arranged in short, submeandroid series; costosepta compact, non-confluent to confluent; laterally covered by small (generally less than 50 µm tall) rounded granulae and carinae-like spines; paliform structures present or absent; columella spongy-papillose or irregularly shaped; synapticulae present throughout the corallum, sparse; endothecal dissepiments thin, vesicular; wall parasynapticulothecal, septothecal in places; pores present occasionally (new description of type species modified from ALLOITEAU, 1957, p. 127). [Material assigned to *Heliastraea* sp. in DIETRICH, 1926, p. 73, from the Aptian of Tanzania is included here.] *Cretaceous:* sub-Saharan Africa,

TABLE 2. Key characteristics of pachyphylliid genera. Present (x); absent or present (+/-); character absent (empty box).

Key Characteristics	Corallum			Budding		Wall			Septa				endothecal dissepiments	exotheca	costae	Columella			paliform structures
	colonial																		
	plocoid	cerio-plocoid	submeandroid	extracalicular (incl. marginal)	intracalicular	parasynapticulotheca	septothecal thickenings	pores	compact	non-confluent	sub-confluent	confluent				lamellar	irregularly shaped segments	spongy-papillose	
Pachyphyllia	x	x		x		x	+/-		x	x	x		x	x	x	x	x		+/-
Columnocoenia	x			x	+/-	x	+/-	+/-	x	x	x	+/-	x	x	x	x	+/-		x
Neocoeniopsis	x	x	x	x	x	x	+/-	+/-	x	x	x	x	x	x	x		+/-	x	+/-

Aptian; western Europe, *Turonian–Campanian;* southern Europe, *Santonian–Maastrichtian;* eastern Europe, *Campanian–Maastrichtian*.——FIG. 4,*a–b*. **N. excelsa* (DE FROMENTEL, 1884) Santonian, France (Le Beausset, Var); *a,* MNHN M03769, calicular view of syntype; *b,* MNHN M03773, oblique calicular view of syntype, (new, courtesy J.-P. Cuif, Paris).——FIG. 4,*c–g. N. fromenteli* M. BEAUVAIS, 1982; *c–d,* NHMW 1891/0005/00063a, Turonian, France (Bouches-du-Rhône); *c,* calicular view of colony; *d,* close-up of *c; e–g,* USNM 164713, Upper Cretaceous (?Santonian), France (Bouches-du-Rhône); *e,* upper surface, calicular view of corallum; *f,* lateral view of colony, thin section; *g,* cross view of colony, thin section (*c–d,* new; *e,* new, courtesy of Michael Ricker, Senckenberg, Frankfurt; *f–g,* new).

ABBREVIATIONS FOR MUSEUM REPOSITORIES

MNHN: Museum National d'Histoire Naturelle, Paris, France

NHMW: Naturhistorisches Museum Wien, Vienna, Austria

NMNH: National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA

UJ: Jagiellonian University, Instytut Nauk, Geologicznych, Krakow, Poland

USNM: United States National Museum, Washington, D.C., USA (collections of which are now in the NMNH)

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