Zootaxa 2742: 49–59 (2011)
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

Gustav Heinrich Kirchenpauer (1808–1887) of the City of Hamburg, and his research on hydroids and bryozoans

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Abstract

Gustav Heinrich Kirchenpauer was born 2 February 1808 in Hamburg, and he died in that city on 3 March 1887. In 1810 he was taken with his family to St. Petersburg, Russia, to escape economic hardships during the occupation of Hamburg and continental blockade of the United Kingdom by Napoleon. He attended secondary school and university in Dorpat (Tartu), Estonia, and earned a doctorate in law from Universtät Heidelberg in 1831. Kirchenpauer returned to Hamburg in 1832 as a lawyer and journalist, gaining recognition as a specialist in international trade. He later served as senator, federal council representative, and seven-time Bürgermeister (mayor) of the city. One of his avocations was natural history, especially taxonomy of hydroids and bryozoans. While he published only six papers with information on Hydrozoa, Kirchenpauer described and named eight genera and 77 species and subspecies of hydroids. Three familiar genera (*Abietinaria*, *Lytocarpia*, *Macrorhynchia*) and nearly half of the species he founded are still recognized as valid. In four papers dealing at least in part with Bryozoa, he named and described one new genus and 26 new species-group taxa in that group. Hydroids and bryozoans studied and described by Kirchenpauer came from many parts of the world, especially Australia, the western Pacific and mid-Pacific islands, South Africa, Europe, the Russian Far East, and the eastern South Atlantic. Kirchenpauer was awarded an honorary doctorate from Universtät Kiel in 1876 for his scientific contributions. One family, one genus, and four species have been named in his honour.

Key words: biography, Bryozoa, Hydrozoa, marine biology, natural history, taxonomy, zoology

Introduction

Natural history was an avocation for several eighteenth and nineteenth century pioneers in the study of hydroids and bryozoans. Among them were clerics (John Fleming, 1785–1857; Thomas Hincks, 1818–1899; Alfred Merle Norman, 1831–1918), physicians (George Johnston, 1797–1855; Thomas Strethill Wright, 1818–1876), and merchants (John Ellis, 1710–1776; Joshua Alder, 1792–1867). Contributions to taxonomy of these groups by Gustav Heinrich Kirchenpauer, lawyer, journalist, statesman, historian, and seven-time Bürgermeister of the Freie und Hansestadt Hamburg (Free and Hanseatic City of Hamburg), are briefly addressed here. Kirchenpauer's hydrozoan work focused on leptothecate hydroids, especially plumularioids and sertularioids.

Methods

Publications by Kirchenpauer were compiled from the *Royal Society of London Catalogue of Scientific Papers* (1800–1863, 1864–1873, 1874–1883, 1884–1900), *The Zoological Record* (volumes 1–42), a bibliography on invertebrates by Thompson (1885), and bibliographic works on hydrozoans by Bedot (1910, 1912, 1916). Dates of publication were determined from the works in which they appeared, or from other sources.

Names of genus- and species-group taxa established by Kirchenpauer (Tables 1, 2) were taken from his publications, and from generic names included in *Nomenclator Zoologicus*. These are listed as originally established except for hyphenated specific names (*Dynamena grosse-dentata; Aglaophenia multiplicato-pinnata*), and one

Accepted by A. Collins: 23 Nov. 2010; published: 17 Jan. 2011

having an umlaut (*Sertularella mülleri*), which have been corrected. Incorrect subsequent spellings of available names, such as *Aglaophemia* for *Aglaophenia* Lamouroux, 1812 (Kirchenpauer 1876: 12), are not included.

Family, Education, and Career

Detailed accounts of the life and professional accomplishments of Kirchenpauer (Figs. 1A, B) are given by von Melle (1888), von Samson (1890), Wohlwill (1903), and Kraepelin (1908), among others. Only highlights of his career as provided in those works are summarized here.

Gustav Heinrich Kirchenpauer was born in Hamburg on 2 February 1808, the son of Johann Georg Kirchenpauer, a businessman, and his wife, Anna Catharina Ruess. Their family also included Johann Eduard (b. 1800, who became a property manager) and Julius (b. 1810, an engineer in Russia). Two other sons (b. 1804 and 1806) died in early childhood. Because of hardships at the time due to the Napoleonic occupation of Hamburg and continental embargo of the United Kingdom, the Kirchenpauer family moved in 1810 to St. Petersburg, Russia, home of Johann Georg's sister Julia and her husband, Jakob von Krause. Anna Catharina Kirchenpauer died after giving birth to Julius, and Johann Georg was often away on business. Jakob, a prosperous merchant, and Julia supported and educated their nephews. The extended family fled to London in the autumn of 1812 during the invasion of Russia by the Grande Armée of Napoleon. They returned to St. Petersburg in the summer of 1813, several months after the Napoleonic forces had retreated.

Kirchenpauer attended the Deutsche Schule of Johann von Muralt in St Petersburg. At age 15 he entered the deutsch-protestantisches Gymnasium (German Protestant High School) at Dorpat (Tartu) in Estonia, and in 1826 began studies in law and political science at Universität Dorpat. In early 1830 he entered Universität Heidelberg as a student of law, and received the degree of Doctor of Jurisprudence in 1831. After completing his education, Kirchenpauer spent several months in Dresden with his uncle Jakob before returning to Hamburg in 1832.

Back in his native city, Kirchenpauer opened a law practice and also worked as a journalist and editor. He specialized in commerce, particularly problems associated with import and export taxes of Hamburg as a Hanse city. With Hamburg being a major port, shipping and issues relating to that industry were an important part of his work. The interest likely led, indirectly, to his later investigations of fouling organisms on buoys ("Seetonnen") in the Elbe River (Kirchenpauer, 1862), and that project in turn is likely to have stimulated a scientific interest in hydroids. Somewhat later, the scope of his research extended to bryozoans. With a reputation for competence, self-reliance, and candor, Kirchenpauer's career advanced rapidly. In 1840 he became Librarian and Secretary of the Chamber of Commerce in Hamburg. When a disastrous fire raged through the city in May 1842, Kirchenpauer was credited with saving the building that housed the stock market. In 1843 he was elected to the senate of the city.

According to Jenkins (2003), Kirchenpauer was an avid student of history, a founding member in 1839 of the Verein für hamburgische Geschichte, and author of an historical account of the city's stock exchange (Kirchenpauer 1841). For many years he urged that local history be taught as a subject in secondary schools. A patriotic citizen of his birthplace and deeply committed to local sovereignty, he later undertook complex and at times heated negotiations with Otto Eduard Leopold von Bismarck (1815–1898) of Prussia over incorporation of Hamburg into the Deutsches Reich (German Empire). Hamburg became a Land of the Reich in 1871.

In 1844, Kirchenpauer married Julie Dorothea Krause (1818–1905), a relative of Jakob von Krause. The couple had three children: Gustav (1847–1914), who became an architect and served in the Sekretär der Deputation für Handel und Schiffahrt (Office of Trade and Navigation) in Hamburg; Flora, who married a German Consul (Dr Hermann Stannius); and Ulrich (1859–1905), who served as a military officer.

A prominent political figure by age 40, Kirchenpauer served in the Bundestag in Frankfurt am Main from 1848 to 1857, a period of political flux in the German states. On 6 June 1858 he was appointed Amtmann zu Ritzebüttel (magistrate of Ritzebüttel), now part of the city of Cuxhaven at the mouth of the Elbe River, and he occupied that post until 29 August 1864. The appointment in Ritzebüttel provided him with opportunities for investigations in natural history. After six years in Ritzebüttel he returned to Hamburg and represented the city in the Federal Council of the Norddeutscher Bund (North German Confederation) from 1867 to 1871, and in its replacement, the Deutsches Reich, from 1871 to 1880. Meanwhile, he served as first or second Bürgermeister of the city seven times between 1869 and 1887 (Fig. 1B), and was active in transforming the educational system of Hamburg from one based on private schools to a system supported by the city-state. One noteworthy school there, the Kirchenpauer

Gymnasium, was later named in his honour. Kirchenpauer also played an important role in the founding of Universität Hamburg.

He died at his desk as mayor on the evening of 3 March 1887, and was interred at Hamburg-Ohlsdorf cemetery in the city.

FIGURE 1. Gustav Heinrich Kirchenpauer, Bürgermeister of the Freie und Hansestad Hamburg, and taxonomist of hydroids and bryozoans. **A**, from Cuxhaven City Archives, photograph number 34C1-00170. **B**, from Wohlwill, 1903, in http://commons.wikimedia.org/wiki/File:Gustav_Heinrich_Kirchenpauer.jpg, last accessed 27 September 2010.

Scientific work

While serving as magistrate in Ritzebüttel, near the North Sea coast, Kirchenpauer began a study of marine invertebrates and algae collected from buoys in the Elbe River estuary. In a short paper authored by British zoophytologist George Busk (1861), with whom he had corresponded, Kirchenpauer described and named *Cordylophora albicola*, a hydroid he supposed to be new. Described in both Latin and English and accompanied by illustrations, his hydroid was later shown to be conspecific with *C. caspia* (Pallas, 1771) (Schuchert 2004).

In all, Kirchenpauer (1862, 1864, 1872, 1874, 1876, 1884) published six papers with information on hydroids over a two-decade period.[1] In them he described eight new nominal genera and 77 new nominal species of hydroids, all but one (*Cordylophora albicola*) being leptothecates (Table 1).[2] Kirchenpauer generally adhered to contemporary classification systems, and especially that followed by George James Allman (1812–1898) of the United Kingdom. While his illustrations were generally accurate, those made from dry specimens (Nutting 1900:60; 1904:96) reflect resulting distortions. Because a number of Kirchenpauer's descriptions are now known to be inadequate, it is impossible to identify with certainty some of the species he established (Millard 1975:5).

His first scientific publication (Kirchenpauer 1862) constituted an early study in marine biology and ecology. It was based on investigations of epibiota collected over several years from buoys in the Elbe River along an environmental gradient from open sea, off the river mouth, to low-salinity waters near the head of the estuary. This was the first study of its kind in the Elbe (Riedel-Lorjé and Gaumert 1982), and it provides useful baseline data about the

1. Written predominantly or entirely in German, Kirchenpauer's papers on hydroids totaled 255 pages. Latin descriptions, in telegraphic style, of supposed new genera and species were given in all but the last of these (Kirchenpauer 1884), in which both descriptions and general text were in German.
2. These include familiar genera such as *Abietinaria*, *Macrorhynchia*, and *Lytocarpia*, and widespread species such as *Tridentata marginata* (sometimes known by the binomen *Sertularia marginata*) and *Macrorhynchia philippina*.

environmental state of the Elbe estuary at the time. Ecological observations on hydroids, crustaceans, worms, molluscs, echinoderms, sea anemones, and algae (including diatoms) of the estuary, as well as seasonal changes in assemblages of organisms, were discussed. Four regions were distinguished along the estuary based on characteristic hydroid species that grew on the buoys: a *Sertularia argentea* Region, seaward of the river mouth; a *Tubularia larynx* Region, in the lower reaches; a *Laomedea gelatinosa* Region, in the middle reaches; a *Cordylophora albicola* Region, in the upper reaches. These regions were correlated with the salinity gradient in the river. In the report Kirchenpauer discussed 10 species of hydroids, and it seems certain that his subsequent interest in taxonomy of the group grew out of this investigation.

In a period of less than five years, his natural history research expanded in geographic scope from regional to global, and the focus of his work shifted from general marine biology to taxonomy, especially of hydroids and bryozoans. His first systematic paper (Kirchenpauer 1864) was a review of the hydroid genus *Dynamena* Lamouroux, 1812 and some 30 species that he assigned to it. Eight of these species were described as new (Table 1), most of them having been found on algae collected from Australia and elsewhere in the Pacific Ocean.

TABLE 1. Names of Hydrozoa proposed by G.H. Kirchenpauer. The letter "K" = Kirchenpauer. Names with an asterisk are currently held to be valid.

**Abietinaria* K, 1884 [type species: *Sertularia abietina* Linnaeus, 1758, by original designation]	
Anisocola K, 1872 [type species: *Sertularia setacea* Linnaeus, 1758, by subsequent designation by Calder (1997)]	
Calathophora K, 1872 [type species: *Sertularia pluma* Linnaeus, 1758, by original designation]	
Isocola K, 1872 [type species: *Aglaophenia gaimardi* Lamouroux, 1824, by subsequent designation by Calder (1997)]	
**Lytocarpia* K, 1872 [type species: *Aglaophenia myriophyllum* Linnaeus, 1758, by original designation]	
**Macrorhynchia* K, 1872 [type species: *Macrorhynchia savignyana* Kirchenpauer, 1872, by original designation]	
Pachyrhynchia K, 1872 [type species: *Aglaophenia cupressina* Lamouroux, 1816, by subsequent designation by Calder (1997: 50)]	
Pluriserialia K, 1876 [type species: none yet designated]	
Abietinaria cartilaginea K, 1884	Bering Sea or Kamchatka
**Abietinaria juniperus* K, 1884	Kuril Islands
**Abietinaria melo* K, 1884	Kuril Islands
**Abietinaria merkii* K, 1884	Russia: Kamchatka
Abietinaria tilesii K, 1884	Russia: Kamchatka
Aglaophenia (*Calathophora*) *alopecura* K, 1872	South Africa
Aglaophenia (*Calathophora*) *avicularis* K, 1872	Australia: Hobart
Aglaophenia (*Calathophora*) *conferta* K, 1872	South Africa: Cape of Good Hope
Aglaophenia (Calathophora) huttoni K, 1876	New Zealand: Lyall Bay
Aglaophenia (*Calathophora*) *plumifera* K, 1872	South Africa: Algoa Bay
Aglaophenia (*Calathophora*) *pusilla* K, 1872	South Africa: Algoa Bay
Aglaophenia (*Calathophora*) *vitiana* K, 1872	Fiji
Aglaophenia (*Lytocarpia*) *crispata* K, 1872	Indonesia: Java. Taiwan
**Aglaophenia* (*Lytocarpia*) *lignosa* K, 1872 (now *Cladocarpus*)	South Africa: Cape of Good Hope
(?)*Aglaophenia* (*Lytocarpia*) *secunda* K, 1872	Pacific Ocean. China Sea. Palau
Aglaophenia (*Macrorhynchia*) *brevicaulis* K, 1872	Australia: Ballina
Aglaophenia (*Macrorhynchia*) *fusca* K, 1872	South Africa: Cape of Good Hope
Aglaophenia (*Macrorhynchia*) *ligulata* K, 1872	South Africa: Algoa Bay
**Aglaophenia* (*Macrorhynchia*) *longirostris* K, 1872 (now *Gymnangium*)	Australia: Wilson's Promontory
Aglaophenia (*Macrorhynchia*) *patula* K, 1872	South Africa: Cape of Good Hope
**Aglaophenia* (*Macrorhynchia*) *philippina* K, 1872	Philippines: Manila
Aglaophenia (*Macrorhynchia*) *ramulosa* K, 1872	Australia: Port Lincoln
Aglaophenia (*Macrorhynchia*) *rostrata* K, 1872	Singapore

continued next page

TABLE 1. (continued)

Aglaophenia (*Macrorhynchia*) *rubens* K, 1872	Australia: Port Denison
Aglaophenia (*Macrorhynchia*) *savignyana* K, 1872	Adriatic Sea (?)
Aglaophenia (*Macrorhynchia*) *squarrosa* K, 1872	Australia: Port Denison
Aglaophenia (*Macrorhynchia*) *urens* K, 1872	Indonesia: Java Sea; Batang. Australia: Brisbane
Cordylophora albicola K, in Busk, 1861	Germany: Elbe River
**Dynamena australis* K, 1864 (now *Sertularia*)	Australia: Port Phillip
**Dynamena conferta* K, 1864 (now *Sertularia*)	Australia: Carpentaria
**Dynamena fasciculata* K, 1864 (now *Amphisbetia*)	Australia: Sydney. New Zealand
**Dynamena grossedentata* K, 1864 (now *Amphisbetia*)	Australia
Dynamena lucernaria K, 1864	Marquesas Islands: Nukahiva
**Dynamena marginata* K, 1864 (now *Tridentata*)	Pacific Ocean
Dynamena penna K, 1864	Australia: Tasmania
Dynamena pleuridentata K, 1864	South Africa: Cape of Good Hope
Nemertesia (*Antennularia*) *antennina* v. *minor* K, 1876	Madeira
Nemertesia (*Antennularia*) *decussata* K, 1876	South Africa: Cape of Good Hope
**Nemertesia* (*Antennularia*) *hexasticha* K, 1876	Indonesia: Java
Nemertesia (*Antennularia*) *johnstoni* K, 1876	South Africa: Algoa Bay
**Nemertesia* (*Antennularia*) *paradoxa* K, 1876	Madeira
**Nemertesia* (*Heteropyxis*) *intermedia* K, 1876	Madeira
**Plumularia* (*Anisocola*) *filicaulis* K, 1876	Chile: Talcahuano
Plumularia (*Anisocola*) *halecioides* var. *adriatica* K, 1876	Adriatic Sea
Plumularia (*Anisocola*) *oligopyxis* K, 1876	Fiji
**Plumularia* (*Anisocola*) *rugosa* K, 1876	"in maribus Europae"
**Plumularia* (*Isocola*) *badia* K, 1876	Australia: Brisbane. Singapore
**Plumularia* (*Isocola*) *cylindrica* K, 1876	Indonesia: Java. Philippines
Plumularia (*Isocola*) *obconica* K, 1876	Australia: Gulf St. Vincent
**Plumularia* (*Isocola*) *tuba* K, 1876 (now *Halopteris*)	South Africa: Algoa Bay
**Plumularia* (*Monopyxis*) *obliqua* var. *australis* K, 1876	Australia: Port Phillip
**Selaginopsis urceolifera* K, 1884 (now *Staurotheca*)	Kerguelen
**Sertularella albida* K, 1884	USA: Shumagin Islands (Yukon Harbor)
Sertularella arborea K, 1884	South Africa: Algoa Bay; Cape of Good Hope
Sertularella contorta K, 1884	Falkland Islands: Lemaire Channel
Sertularella fruticulosa K, 1884	Russia: Kamchatka
Sertularella muelleri K, 1884	Australia: Chatham Island
**Sertularella pallida* K, 1884 (now *Symplectoscyphus*)	Unalaska
Sertularella purpurea K, 1884	Australia: Chatham Island
**Sertularella reticulata* K, 1884 (now *Dictyocladium*)	Australia: Bass Strait
**Sertularella secunda* K, 1884 (now *Symplectoscyphus*)	South Africa: Cape of Good Hope
Sertularella sieboldi K, 1884	Cuba
Sertularella sonderi K, 1884[1]	no provenance given
**Sertularella spinosa* K, 1884	Japan: Yokohama, Nagasaki
Sertularella squamata K, 1884	Strait of Magellan
**Sertularella tilesii* K, 1884	"Nordostlichen Meeren"

continued next page

TABLE 1. (continued)

Sertularella tricuspidata var. *acuminata* K, 1884	Russia: Kamchatka
**Thuiaria acutiloba* K, 1884 (now *Salacia*)	Kuril Islands or Kamchatka
**Thuiaria annulata* K, 1884 (now *Abietinaria*)	no provenance given
Thuiaria cartilaginea K, 1884	Australia: New South Wales
Thuiaria doliolum K, 1884	South Africa: Cape of Good Hope
**Thuiaria elegans* K, 1884 (now *Amphisbetia*)	Bering Sea
**Thuiaria polycarpa* K, 1884 (now *Parathuiaria*)	Chile: Valparaiso
**Thuiaria stelleri* K, 1884 (now *Thuiaria*)	Russia: Kamchatka
Aglaophenia (*Calathophora*) *graeffii* K, 1876[2]	South-sea Islands
Aglaophenia (*Calathophora*) *phyteuma* K, 1876[2]	Tonga
Aglaophenia (*Calathophora*) *tenerrima* K, 1876[2]	Chile
Aglaophenia (*Calathophora*) *tongensis* K, 1876[2]	South-sea Islands
Aglaophenia (*Macrorhynchia*) *multiplicatopinnata* K, 1876[2]	Red Sea
Aglaophenia (*Macrorhynchia*) *pansa* K, 1876[2]	Tonga
Aglaophenia (*Macrorhynchia*) *perforata* K, 1876[2]	Tonga
Aglaophenia opposita K ms, in Studer, 1889[3]	western Australia

[1] The original account of *Sertularella sonderi* included only an illustration and its figure caption (Kirchenpauer (1884: plate 16, fig. 4), but that is sufficient to make the name available (ICZN Art. 12.2.7). It was included as a synonym of *Sertularella neglecta* Thompson, 1879 [*Symplectoscyphus neglectus*] by Bale (1915).

[2]These seven names are nomena nuda; Kirchenpauer (1876) provided neither descriptions, nor illustrations, nor "indications," for them (ICZN Art. 12.1, International Commission on Zoological Nomenclature 1999). *Aglaophenia graeffii* Kirchenpauer, 1876 and *A. perforata* Kirchenpauer, 1876 had been recognized earlier as nomena nuda (Calder 1997; Schuchert 2003). All were subsequently made available by Stechow (1919), who provided descriptions and illustrations of them, and they take authorship and date from that publication. Names as established for these hydroids by Stechow were: *Lytocarpia graeffei* (not as *graeffii*), *Thecocarpus phyteuma*, *Aglaophenia tenerrima*, *Aglaophenia tongensis* [included as a synonym of *Thecocarpus brevirostris* (Busk, 1852)], *Lytocarpia multiplicatopinnata*, *Halicornaria pansa*, and *Aglaophenia perforata* [included as a synonym of *Lytocarpia philippina* (Kirchenpauer, 1872)].

[3]The name *Aglaophenia opposita*, from an unpublished manuscript by Kirchenpauer but listed in Studer (1889) without description, definition, illustration, or indication, is a nomen nudum.

In the 1870s, Kirchenpauer published two landmark works on plumularioid hydroids.[3] Charles Cleveland Nutting (1900:3), an American hydroid specialist, credited him as being one of the leading contributors to knowledge of the group. The first work (Kirchenpauer 1872), a study of *Aglaophenia* Lamouroux, 1812, included accounts of four new subgenera and 21 new species (Table 1). Two of the subgenera are now recognized at the rank of genus (*Lytocarpia* and *Macrorhynchia*). The second paper (Kirchenpauer 1876) dealt with *Plumularia* Lamarck, 1816 and *Nemertesia* Lamouroux, 1812. Fifteen new species and varieties were named and described (Table 1), and a new name (*Aglaophenia huttoni*) was given to a species from New Zealand that had been misidentified as *Plumularia pennatula* (Ellis and Solander 1786) by Hutton (1873). In between these two reports, Kirchenpauer (1874) contributed an account of four species of hydroids collected during the Zweite Deutsche Nordpolarfahrt (Second German North Polar Expedition) in 1869–1870.

His final work on hydroids (Kirchenpauer 1884), published when he was 76 years old, was a revision of genera and species of Sertulariidae from high latitudes in the Northern Hemisphere.[4] In it, one new genus (the now widely-

3. Plumularioid hydroids are defined by Cornelius (1995) as "…the group of thecates with uniseriate hydrothecae." Included are four families, Aglaopheniidae, Halopteridídae, Kirchenpaueriidae, and Plumulariidae. A familiar genus in the group is *Plumularia*.
4. Sertulariidae is a large family of hydroids, especially well represented in colder waters. Most are characterized by having biseriate, cusped, operculate hydrothecae (Cornelius 1995). A familiar genus in the family is *Sertularia* Linnaeus, 1758.

known and species-rich *Abietinaria*) and 31 new species and varieties were described (Table 1). Over half of these new nominal species were assigned to *Sertularella* Gray, 1848.[5]

Like contemporaries including George Busk (1807–1886) and Thomas Hincks (1818–1899) of Great Britain, Kirchenpauer published on taxonomy of bryozoans (Kirchenpauer 1869, 1874, 1875, 1879) as well as hydroids. However, his works on Bryozoa, spanning only 73 pages excluding plates, constitute a relatively minor contribution to knowledge of the group. One new genus name (*Retihornera* Kirchenpauer, 1869) and 26 new species-group names were established in them (Table 2). His most thorough work on bryozoans was on species of *Adeona* Lamouroux, 1812, collected during the Expedition of S.M.S. *Gazelle* in 1874–1876 (Kirchenpauer 1879). That paper included a systematic account of 10 species-group taxa, including six described as new, together with discussion of colony morphology in the group. His first publication on bryozoans (Kirchenpauer 1869) had provided an account of material at the Museum Godeffroy, Hamburg, most of it collected in Australia and Pacific islands by German ship captains. Published in the rare Museum Godeffroy Catalog series (Evenhuis 2007), one new genus and 14 new species were introduced in the work (Table 2). Five years later, he wrote a taxonomic account based on a small collection of hydroids and bryozoans collected in Greenland during the Second German North Polar Expedition (Kirchenpauer 1874). The following year, he published a report on 53 species of Bryozoa (including 39 cheilostomes, eight cyclostomes, and seven ctenostomes) and one species of Entoprocta collected in the North Sea during 1872 by the vessel *Pommerania* (Kirchenpauer 1875). He paid particular attention to species and forms of the genus *Flustra* Linnaeus, 1761 in the collection. Before his death Kirchenpauer was preparing a manuscript on Bryozoa (exclusive of *Adeona* and its species) collected during the voyage of the *Gazelle*, but it was never published.[6]

TABLE 2. Names of Bryozoa proposed by G.H. Kirchenpauer. The letter "K" = Kirchenpauer. Names with an asterisk are currently held to be valid.

Retihornera K, 1869 [type species: none yet designated]	
**Adeona albida* K, 1880	northwestern Australia: Mermaid Strait
**Adeona arborescens* K, 1880	western Australia: Dirk Hartog Island
Adeona cellulosa var. *ochracea* K, 1880	Australia
**Adeona foliacea* var. *fascialis* K, 1880	western Australia: Dirk Hartog Island
**Adeona intermedia* K, 1880	South Africa: Algoa Bay
**Adeona macrothyris* K, 1880	northwestern Australia
Cellepora tridens K, 1875	North Sea
**Eschara reniformis* K, 1869 (now *Parmularia*)	Australia: Gulf St. Vincent
Eschara spongiaeformis K, 1869	Australia: Gulf St. Vincent
Farciminaria punctata K, 1869	South Africa
Flustra dichotoma K, 1875	North Sea
Hemeschara contorta K, 1874	east Greenland: north of Shannon Island
**Hornera australis* K, 1869	Australia: Bass Strait
Idmonea flabellata K, 1869	Australia: Gulf St. Vincent
**Lepralia smittii* K, 1874 (now *Smittina*)	Spitzbergen. Norway
Onchopora salicornioides K, 1869	Fiji

continued next page

5. Kirchenpauer recognized two groups of species in the genus *Sertularella* as then understood, a "*Sertularella polyzonias*" group having four or five marginal cusps on the hydrothecal rim, and a "*Sertularella tricuspidata*" group with three marginal cusps. The latter group was later recognized as constituting a separate genus, *Symplectoscyphus* Marktanner-Turneretscher, 1890.
6. Names of 20 putative new species from Kirchenpauer's manuscript on Bryozoa were listed in a report on results of the *Gazelle* Expedition by Studer (1889), but all are nomena nuda. The name *Dendrofascipora* applied by Kirchenpauer to three species of Bryozoa in Studer's report, if intended for a new genus, is also unavailable from that work. Studer included three other binomina that he attributed to Kirchenpauer, but all three names had been established earlier by other authors (*Scrupocellaria gracilis* Reuss, 1869, *Lepralia crassilabra* Manzoni, 1875, and *Vincularia labiata* Busk, 1884).

TABLE 2. (continued)

Retihornera affinis K, 1869	Fiji
Retihornera corbicula K, 1869	Australia: Bass Strait
Retihornera dentata K, 1869	Australia: Bass Strait
**Retihornera graeffei* K, 1869 (now *Reteporella*)	Fiji
Retihornera parasitica K, 1869	Australia: Gulf St. Vincent
Retihornera plicata K, 1869	Australia: Gulf St. Vincent
**Salicornaria pilosa* K, 1869 (now *Cellaria*)	Australia: Bass Strait
**Serialaria semispiralis* K, 1869 (now *Amathia*)	Samoa
Hornera lichenoides forma *flabellaris* K, 1874	east Greenland
**Hornera lichenoides* forma *reticulata* K, 1874	east Greenland
Catenicella amphotis K ms, in Studer, 1889[4]	western Australia
Cellaria inflata K ms, in Studer, 1889[4]	northwestern Australia
Cellaria labellata K ms, in Studer, 1889[4]	northern New Zealand
Cupularia perforata K ms, in Studer, 1889[4]	Liberia
Dendrofascipora dichotoma K ms, in Studer, 1889[4]	northern New Zealand: Three Kings Islands
Dendrofascipora simplex K ms, in Studer, 1889[4]	northern New Zealand
Dendrofascipora spinosa K ms, in Studer, 1889[4]	northern New Zealand
Eschara perosa K ms, in Studer, 1889[4]	Liberia
Gemellaria cyclostoma K ms, in Studer, 1889[4]	northern New Zealand
Lepralia megapora K ms, in Studer, 1889[4]	western Australia
Menipea gazellae K ms, in Studer, 1889[4]	Kerguelen
Menipea simplex K ms, in Studer, 1889[4]	Argentina
Menipea studeri K ms, in Studer, 1889[4]	Argentina
Menipea vibracularis K ms, in Studer, 1889[4]	Argentina
Pustulipora spiralis K ms, in Studer, 1889[4]	western Australia. northern New Zealand
Pustulipora verticillata K ms, in Studer, 1889[4]	western Australia
Retihornera flabellum K ms, in Studer, 1889[4]	Kerguelen
Salicornaria avicularis K ms, in Studer, 1889[4]	Kerguelen
Selenaria expleta K ms, in Studer, 1889[4]	northern New Zealand
Tubucellaria meridionalis K ms, in Studer, 1889[4]	northwestern Australia

[4]The manuscript by Kirchenpauer in which these 20 binomena were introduced was never published. Names from that manuscript were listed by Studer (1889), but without descriptions, illustrations, or indications. All are nomena nuda.

In addition to his own publications on hydroids and bryozoans, Kirchenpauer provided identifications of the two groups in works by several others (von Heuglin 1874; von Muller 1884; Studer 1889).

Kirchenpauer is sometimes cited as author of the generic name *Kirchenpaueria*, as applied to Bryozoa. However, he quoted it only as a manuscript name used in an unpublished work by Graeffe (Kirchenpauer 1869: page xxx) and was not attempting to name a genus after himself. As a nomen nudum, it does not threaten the name *Kirchenpaueria* Jickeli, 1883, currently valid for a genus of Hydrozoa.

Types of new species of plumularioid hydroids founded by Kirchenpauer (1872, 1876) were later examined and illustrated by Stechow (1919). Stechow's account is particularly important because most of the Kirchenpauer collection was lost during the Second World War (Millard 1975:5, 415). Some types of species from Australia exist in the Museum Victoria, Melbourne.[7] Much of the Kirchenpauer collection of Bryozoa was also apparently destroyed during the war (Cook 1965), although some material from the *Gazelle* Expedition exists in the Museum für Naturkunde, Berlin (Cook and Chimonides 1984).

On 7 April 1875 Kirchenpauer became a member of the Kaiserlichen Leopoldino-Carolinischen Deutschen Akademie der Naturforscher (*Leopoldina* 11:53) and he remained so until his death in 1887 (*Leopoldina* 23:42, 58). In addition to numerous honours for distinguished public service, he was awarded an honorary doctorate from Universität Kiel for his contributions to science. He characteristically remained modest about the honour, stating with regard to his scientific discoveries that even a blind chicken occasionally finds a kernel of grain ("…findet ein blindes Huhn: auch wol einmal ein Korn").

Although Kirchenpauer's final paper in natural history was published in 1884, his research is still mentioned in current scientific literature. Citations of his work in 16 papers since 2000 were recorded in the "Cited Reference Index" of "Web of Science"[8] with five each of the works on *Aglaophenia* (Kirchenpauer 1872) and northern Sertulariidae (Kirchenpauer 1884). The most frequently cited publications by Kirchenpauer in works between 1900 and early 2010 were his papers on northern Sertulariidae (Kirchenpauer 1884:10 times), on *Aglaophenia* (Kirchenpauer 1872:8 times), on fouling organisms of the Elbe estuary (Kirchenpauer 1862:6 times) and on *Plumularia* and *Nemertesia* (Kirchenpauer 1876:6 times).

One family, Kirchenpaueriidae Stechow, 1921 (Hydrozoa), one genus, *Kirchenpaueria* Jickeli, 1883 (Hydrozoa), and four species, *Lepralia kirchenpaueri* Heller, 1867 (Bryozoa; now *Hagiosynodos kirchenpaueri*), *Plumularia kirchenpaueri* Heller, 1868 (Hydrozoa; now *Aglaophenia kirchenpaueri*), *Thuiaria kirchenpaueri* Marktanner-Turneretscher, 1895 (Hydrozoa; now a synonym of *Thuiaria carica* Levinsen, 1893), and *Nesotragus kirchenpaueri* Pagenstecher, 1885 [Mammalia; now a synonym of *Nesotragus moschatus* (von Dueben, in Sundevall, 1846)], are named in his honour.

Acknowledgements

We are grateful to Judith Winston (Virginia Museum of Natural History) and Priska Schäfer (Institut für Geowissenschaften der Universität Kiel) for help in obtaining an obscure publication on Bryozoa by Kirchenpauer (1875). Lars Schmidt (Stadarchiv Cuxhaven) provided one of the photographs used herein. Sincere thanks are expressed to Lester Stephens (University of Georgia) and an anonymous referee for helpful comments, and to Allen Collins (National Museum of Natural History, Smithsonian Institution) for editing the manuscript.

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