Short addition to
Géominpal Belgica. 6
Comments and reflections on existing Distribution Maps

By

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April 2014

Data furnished by the study of the distribution maps of the extant species

This short addition is in fact a compilation of the distribution maps of all the extant species of the four Orders of Chondrichthyes revised in *Géominpal Belgica* **6**.

This compilation is completed by some reflections concerning the causes which were at the origin of their present distribution, their implication in their progressive dispersal and the degree of relationship existing between these species.

Quaternary deductions and implications

As the populations of one extant species occupy a more or less extended zone and a more or less known depth range, it seems logical to suppose that their direct ancestors occupied similar geographical zones and similar depth ranges.

Consequently, some extant populations of one species are maybe these ancestors, but other extant populations of the same species could also be supposed to be their ancestors.

Geographical arguments, such as the importance of the distance separating these populations, and geophysical arguments, such as the Plate Tectonics having induced the formation of very deep oceanic trenches, allow eliminating diverse extant populations of other living representatives of the same Genus.

Upper Cenozoic deductions and implications

After having tried to reconstitute the possible relationships existing between the extant representatives of one Genus, the search of the Cenozoic ancestors of these species becomes easier because the zones of research of these ones are better defined.

The ancestor of one extant western European species is surely not a fossil taxon discovered in southern Australia.

Lower Cenozoic to Upper Cenozoic deductions and implications

Developing progressively the same approach, diverse logical phylogenetic lineages become evident, or at least, plausible.

This review, as complete as possible, follows the Systematics Proposals of *Géominpal Belgica*. **6**.

General Systematics implication

All the extant generic taxa are based on one holotype belonging to one of its diverse populations. The automatic attribution of all the other populations that present some morphological similarities with the holotype to the same Genus is not a sufficient guarantee to justify these attributions.

The mentioning *sensu* HERMAN & VAN WAES, 2014, added below the name of one extant Family, means that one of the former biological conceptions of this Family is respected but that diverse extinct taxa, which were generally included in this Family, were revised by the senior-author in 2014.

Family Chlamydoselachidae GARMAN, 1884
***sensu* HERMAN & VAN WAES, 2014**

Genus *Chlamydoselachus* GARMAN, 1884

Distribution map of *Chlamydoselachus anguineus* GARMAN, 1884
Source: **www.nl.wikipedia.org**

Distribution map of *Chlamydoselachus africana* EBERT & COMPAGNO, 2009
Source: www.en.wikipedia.org

Comments concerning the distribution of the extant populations of the Genus *Chlamydoselachus*

The type population of this Genus, being one of the Japanese populations, the recent distinction of a new species inhabiting off the coasts of South Africa, poses the question of the validity of the attribution of all the other populations of *Chlamydoselachus* to the species *Chlamydoselachus anguineus*.

The anatomical and morphological description of *Chlamydoselachus africana**, lacking SEM photographs of its teeth, does not simplify the attempts to find a solution to this problem.

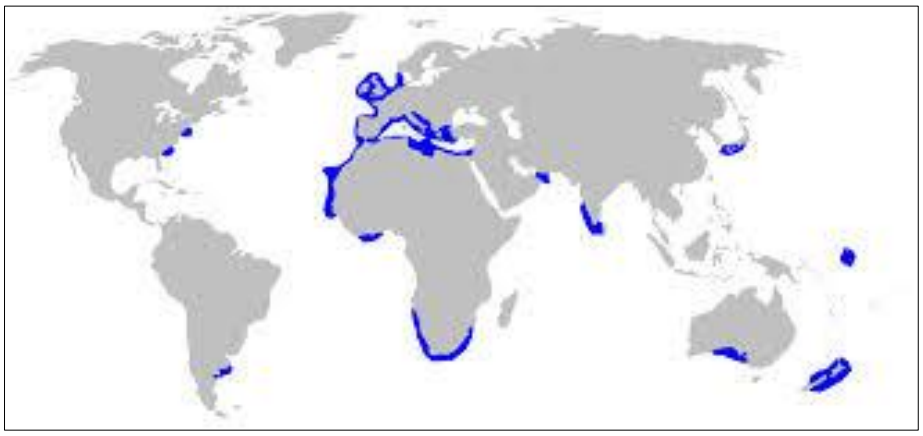
*Ebert & Compagno, 2009.

Geologically, it seems possible and logical that all the populations scattered in the North Atlantic and the South Atlantic have the same genetic code and a common ancestor of early Oligocene Age.

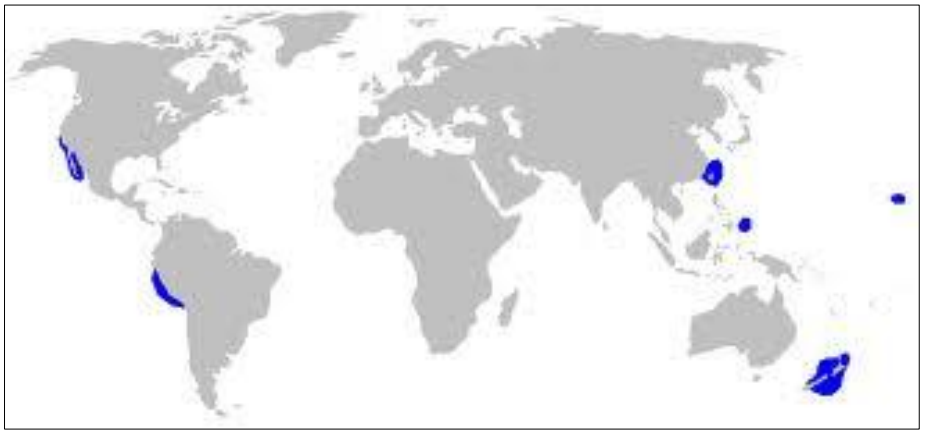
But such considerations remain purely hypothetical. The multiple geological events which have affected the structure of the bottom of the Pacific Ocean after the Oligocene Period make further investigations concerning the relationships of the eastern Pacific populations with this of the type species necessary.

Family Echinorhinidae GILL, 1862
***sensu* HERMAN & VAN WAES, 2014**

Genus *Echinorhinus* de BLAINVILLE, 1816



Distribution map of *Echinorhinus brucus* (BONNATERRE, 1788)
Source: www.fr.wikipedia.org



Distribution map of *Echinorhinus coockei* PIETSCHMANN, 1928
Source: www.en.wikipedia.org

Comments concerning the distribution of the extant populations of the Genus *Echinorhinus*

The important difference between the areas inhabited by these two taxa is a solid argumentation for the acceptance of the existence of two extant taxa of this Genus which has Lower Cretaceous representatives.

The senior-author considers that the lack of any mentioning of catches in the Atlantic Ocean of individuals, presenting dermal denticles so different from these of *Echinorhinus brucus*, by European fishermen who have known this species since the 17th century, may be considered as a guarantee that the *Echinorhinus coockei*-like individuals are really representatives of a distinct species.

The type population of *Echinorhinus brucus* is one of its Mediterranean populations. The temporal distribution of the whole Family is sufficiently large to allow supposing that all its Atlantic populations have common ancestors that lived there before the opening of the southern Atlantic.

The degree of relationship of its Indo-Pacific populations with the Atlantic ones requires further investigations.

The degree of relationship existing between all the Indo-Pacific populations of *Echinorhinus coockei* also requires further investigations and particularly of these inhabiting off the western American coasts.

Family Hexanchidae GRAY, 1851
***sensu* HERMAN & VAN WAES, 2014**

Genus *Hexanchus* RAFINESQUE, 1810

Distribution map of *Hexanchus griseus* (BONNATERRE, 1788)
Source: www.en.wikipedia.org

Distribution map of *Hexanchus nakamurai* TENG, 1962
Source: www.wikipedia.org

Systematics problems and remarks concerning the distribution of these three taxa

The world-wide distribution of the species *Hexanchus griseus* may indicate that its far ancestors appeared before the beginning of the opening of the southern Atlantic, but diverse populations attributed to this species are able to live at a depth of more than 2.000 metres and their ancestors were maybe able to cross young oceanic ridges.

The holotype of this species is an individual of one of its northern Mediterranean populations. The genetic code of none of its other populations was ever compared with the genetic code of the type-population.

It is important to point out that the teeth of all the individuals attributed to *Hexanchus griseus* have the same fundamental structure, vascularization and morphology but do present a very large variety of morphotypes.

The senior-author disagrees with the opinion to consider *Hexanchus vitulus* SPRINGER & WALLER, 1969 as a synonym of *Hexanchus nakamurai* TENG, 1962.

The western Atlantic populations of this Genus are the representatives of *Hexanchus vitulus* and were separated from the Indo-Pacific ones, at the Pliocene Period, after the complete emersion of the Cordilleras de los Andes.

While the morphology of the anterior and lateral teeth of *Hexanchus nakamurai* and *Hexanchus vitulus* is relatively similar, the morphology of their commissural teeth allows distinguishing these species.

It is also obvious that *Hexanchus vitulus* is absent in the whole central part of the Indian Ocean and in the whole central and eastern parts of the Pacific Ocean.

Family Heptranchidae COMPAGNO, 1973
***sensu* HERMAN & VAN WAES, 2014**

Genus *Heptranchias* RAFINESQUE, 1810

Distribution map of *Heptranchias perlo* (BONNATERRE, 1788)
Source: www.fr.wikipedia.org

Comments concerning the distribution of the extant populations of the Genus *Heptranchias*

The presence of numerous populations of *Heptranchias perlo* scattered in North and South Atlantic deep waters suggests that their ancestral populations inhabited the same areas far before the opening of the South Atlantic Ocean. The discontinuity of the areas where its extant Pacific populations live is more difficult to explain. In the Indian Ocean, they seem to have followed the tectonic moving of the Madagascar and Indian Plates. Their present discontinuous distribution in the diverse parts of the Pacific Ocean, and particularly their absence off the eastern Indian, Malaysian, Indonesian, Papuan and Philippine coasts remains unexplained.

The holotype of this species is an individual of one of its northern Mediterranean extant populations. The morphology of the dentition of the southern Mediterranean and the western African extant populations is absolutely identic to this of the type population.

The morphology of the crown of the anterior teeth of some Indo-Pacific specimens is highly variable. It may include teeth with a sigmoidal first cuspid, very similar to the one presented by the anterior teeth of the extinct Genus *Weltonia* WARD, 1979, which was discovered in levels of Upper Cretaceous to Lower Paleocene Ages in North Africa.

The survival of this generic taxon to Present Times is a possibility which requires a control of the genetic code of all these extant populations.

Genus *Notorynchus* AYRES, 1855

Distribution map of *Notorynchus cepedianus* (PERON, 1807)
Source: www.fr.wikipedia.org

Comments concerning the distribution of the extant populations of the Genus *Notorynchus*

The holotype of this species is an individual of one of its southern American populations. The presence of numerous populations of *Notorynchus cepedianus* scattered in South Atlantic deep waters suggests that their ancestral populations inhabited the same areas far before the opening of the South Atlantic Ocean.

As well as the morphology of the three extant taxa of the Genus *Hexanchus* and this of *Heptranchias perlo*, the morphology of the crown of the anterior teeth of the other populations is highly variable.

The attribution of all the non-Argentinian populations of *Notorynchus* to the taxon *Notorynchus cepedianus* requires further investigations before it can be definitely admitted.

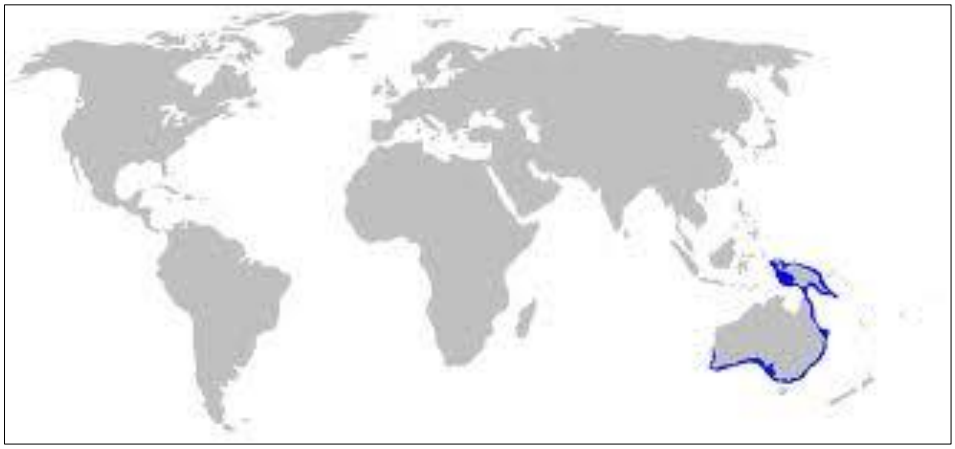
When an extant hexanchid shark in possession of seven pairs of gill-slits was caught it seemed logical to attribute this individual to the single extant species presenting this anatomical singularity.

The vernacular name, *broadnose sevengill shark*, for *Notorynchus cepedianus* is in fact an English designation, but French, Spanish and Chinese fishermen have also other vernacular names for this species.

Family Orectolobidae GILL, 1862
***sensu* HERMAN & VAN WAES, 2014**

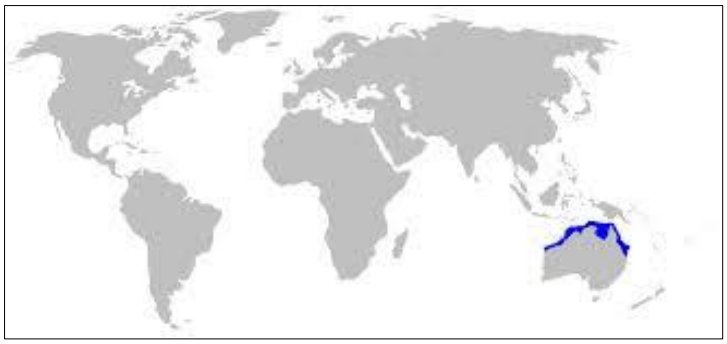
Genus *Orectolobus* BONAPARTE, 1834

Distribution map of *Orectolobus maculatus* (BONNATERRE, 1788)
Source: www.en.wikipedia.org



Distribution map of *Orectolobus ornatus* (DE VIS, 1883)
Source: commons.wikimedia.org

Distribution map of *Orectolobus japonicus* REGAN, 1906
Source: commons.wikimedia.org



Distribution map of *Orectolobus wardi* WHITLEY, 1939
Source: commons.wikimedia.org

Distribution map of *Orectolobus halei* WHITLEY, 1940
Source: commons.wikimedia.org

Distribution map of *Orectolobus hutchinsi* LAST, CHIDLOW & COMPAGNO, 2006
Source: www.en.wikipedia.org

Comments concerning the distribution of the extant populations of the Genus *Orectolobus*

Orectolobus floridus LAST & CHIDLOW, 2008, *Orectolobus parvimaculatus* LAST & CHIDLOW, 2008, *Orectolobus leptolineatus* LAST, POGONOSKI & CHIDLOW, 2010 and *Orectolobus reticulatus* LAST, POGONOSKI & WHITE, 2010 seem to be represented by very local populations of uncertain status and without signification for the understanding of the world distribution of the Genus *Orectolobus*.

The individuals of *Orectolobus parvimaculatus* LAST & CHIDLOW, 2008 and *Orectolobus reticulatus* LAST, POGONORSKI & WHITE, 2008, represented by small communities scattered off diverse coasts of Australia were, apparently, frequently confused with other species of Australian *Orectolobus.*

The principal evolutionary signification of this multitude of populations attributable to the Genus *Orectolobus* along the Australian coasts is that the isolation of the Australian Plate has favoured the survival and the diversification of some very primitive generic taxa of Chondrichthyes.

Genus *Sutorectus* WHITLEY, 1939

Distribution map of *Sutorectus tentaculatus* (PETERS, 1864)
Source: www.en.wikipedia.or

Comments concerning the distribution of the extant populations of the Genus *Sutorectus*

The Genus *Sutorectus* is represented by a single extant species: *Sutorectus tentaculatus*. This taxon regroups diverse populations dispersed off the southeastern coasts of Australia.

The morphology of the individuals of these diverse populations, which the senior-author had the possibility to examine or to see on photographs, is sufficiently similar to allow supposing that they are representatives of a single species.

Genus *Eucrossorhinus* REGAN, 1908

Distribution map of *Eucrossorhinus dasypogon* (BLEEKER, 1867)
Source: www.commons.wikimedia.org

Comments concerning the distribution of the extant populations of the Genus *Eucrossorhinus*

Such as the Genus *Sutorectus*, the Genus *Eucrossorhinus* is represented by a single extant species: *Eucrossorhinus dasypogon*.

This taxon regroups numerous, and sometimes very dense populations dispersed off the coasts of a large area including the most northern part of Australia, the Gulf of Carpentaria and all the coasts of Papua and New Guinea.

The morphology of the individuals of the diverse populations of this area, which the senior-author had the possibility to examine or to see on photographs, is sufficiently similar to allow supposing that they are representatives of a single species.

A second group of populations inhabiting the coasts of Myanmar and Malaysia is attributed to this species. The senior-author, who never had the possibility to compare the morphology or the dentition of any individual of these populations, is unable to certify whether this attribution is justified or not.

If this attribution is not justified, these populations may be representatives of a distinct species which could be considered as a potential ancestor of *Eucrossorhinus dasypogon*, because of its more northern distribution area*.

*If, as proposed in *Géominpal Belgica*. **6**, the origin of the principal lineages of the Orectolobiformes may be located in the Near East, their successive populations have progressively colonized the coasts of the Indian Ocean before occupying Myanmar and Papua and before reaching the Australian coasts.

Comments concerning the distribution of the extant populations of the Family Orectolobidae *sensu* GILL, 1862

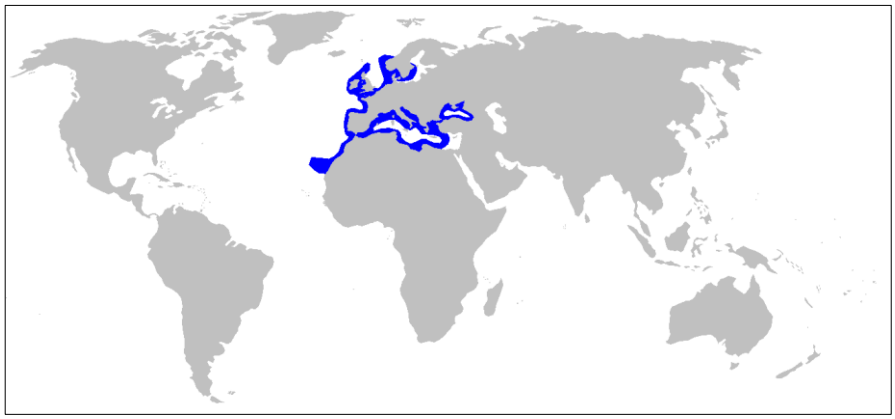
Dr. Gill seems to have been the first scientist who realized that the anatomical singularities of the three extant Genera he regrouped in one Family allowed distinguishing these three Genera from all the other orectolobid-Elasmobranchii.

Dr. Applegate, in 1974, and Dr. Compagno, in 1984, both ignoring the phylogenetic data that may be furnished by the examination of the dentition of all their extant and extinct taxa, opted for the regrouping of taxa of different phylogenetic lineages in a single Family.

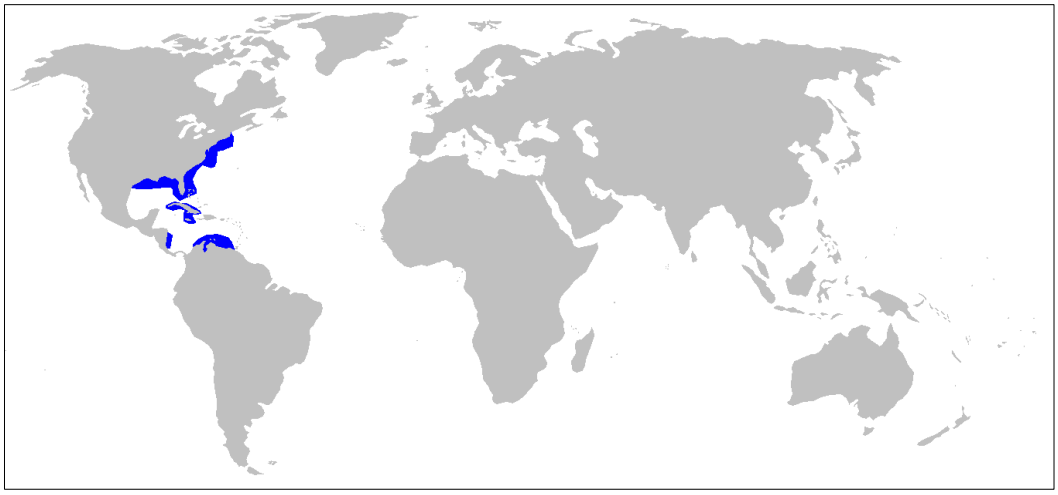
In fact it was some extinct members of the Super Order Squatinomorphii HERMAN & VAN WAES, 2012 which represented the link between the Orectolobidae *sensu* GILL, 1862 and the Orectolobidae *sensu* COMPAGNO, 1984.

Family Squatinidae BONAPARTE, 1838
***sensu* HERMAN & VAN WAES, 2014**

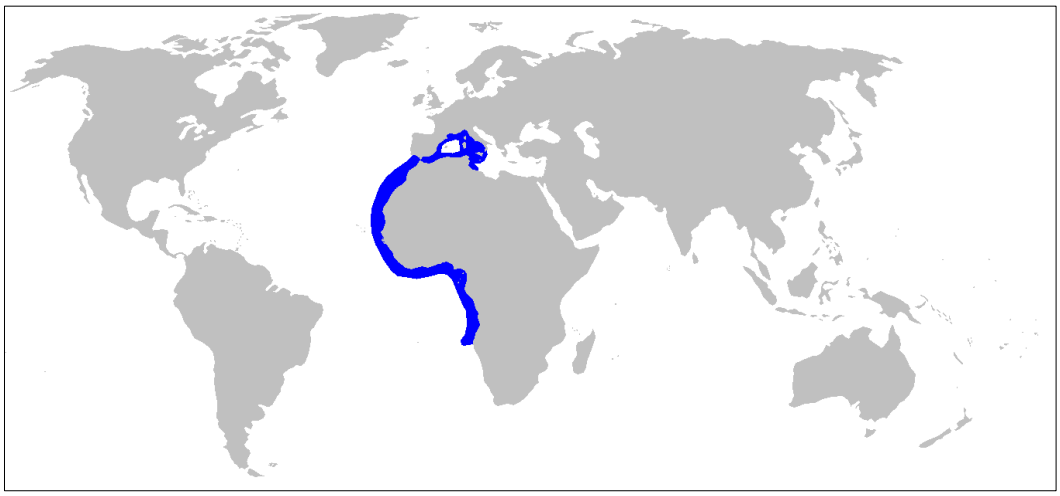
Genus *Squatina* DUMERIL, 1806



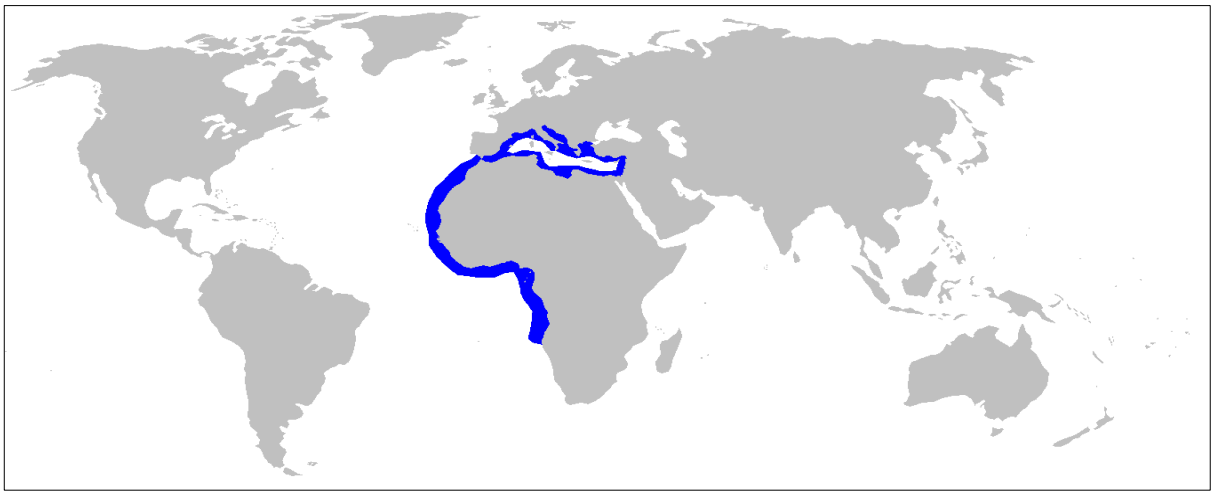
Distribution map of *Squatina squatina* (LINNAEUS, 1818)
Source: www.commons.wikimedia.org



Distribution map of *Squatina dumeril* LESUEUR, 1818
Source: www.fr.wikipedia.org

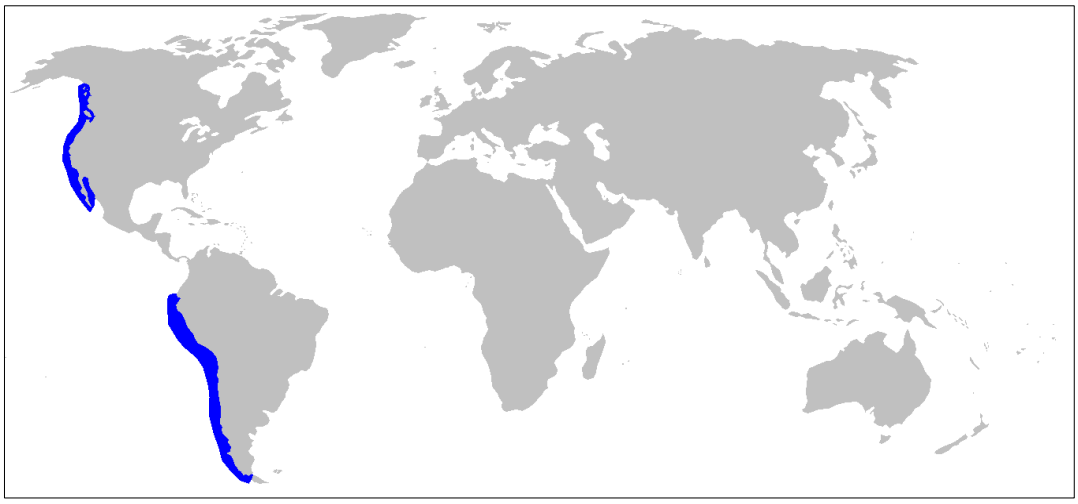


Distribution map of *Squatina aculeatea* CUVIER, 1818
Source: www.fr.wikipedia.org

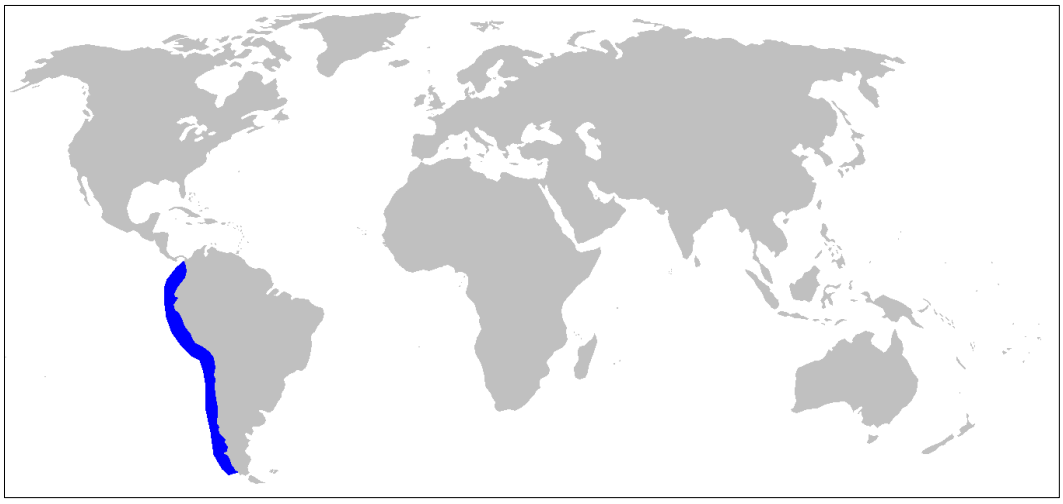


Distribution map of *Squatina oculata* BONAPARTE, 1840
Source: www.nl.wikipedia.org

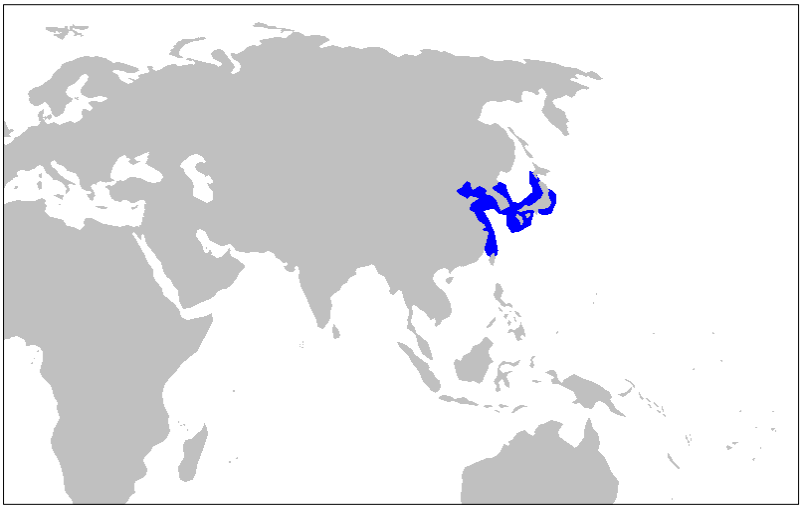
Distribution map of *Squatina japonica* BLEEKER, 1858
Source: www.commons.wikimedia.org



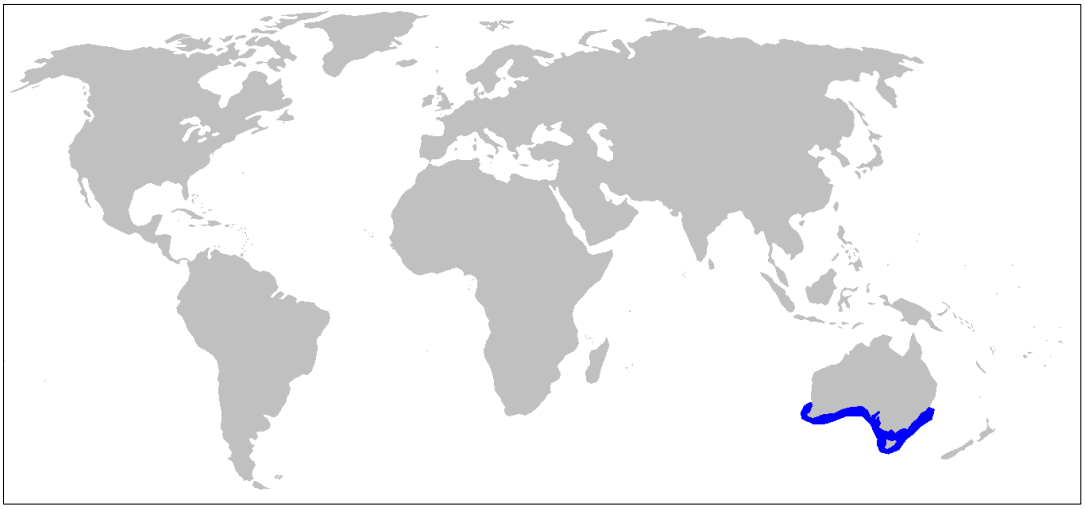
Distribution map of *Squatina californica* AYRES, 1859
Source: www.nl.wikipedia.org



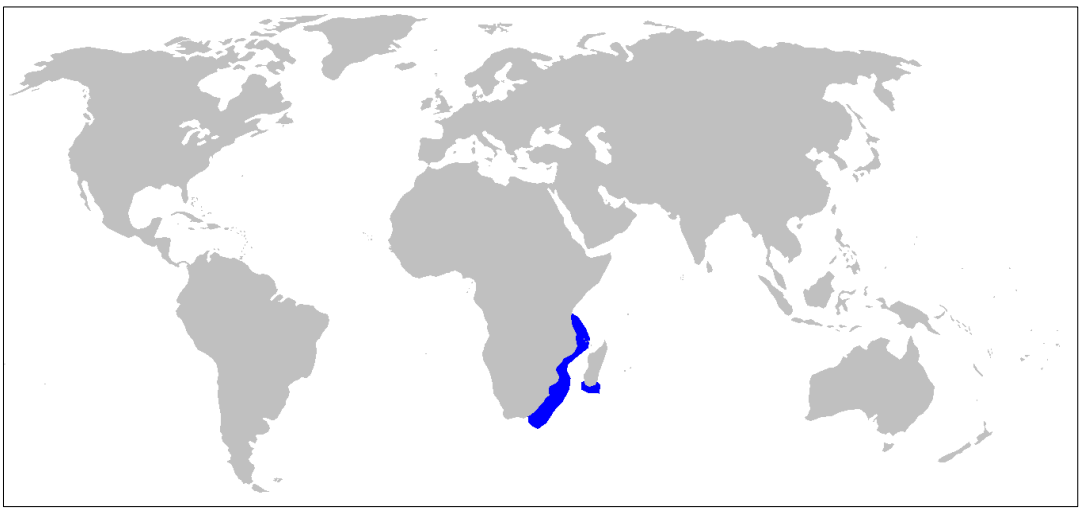
Distribution map of *Squatina armata* (PHILIPPI *in* KRUMWEIDE, 1887)
Source: www.commons.wikimedia.org



Distribution map of *Squatina nebulosa* REGAN, 1906
Source: www. nl.m.wikipedia.org

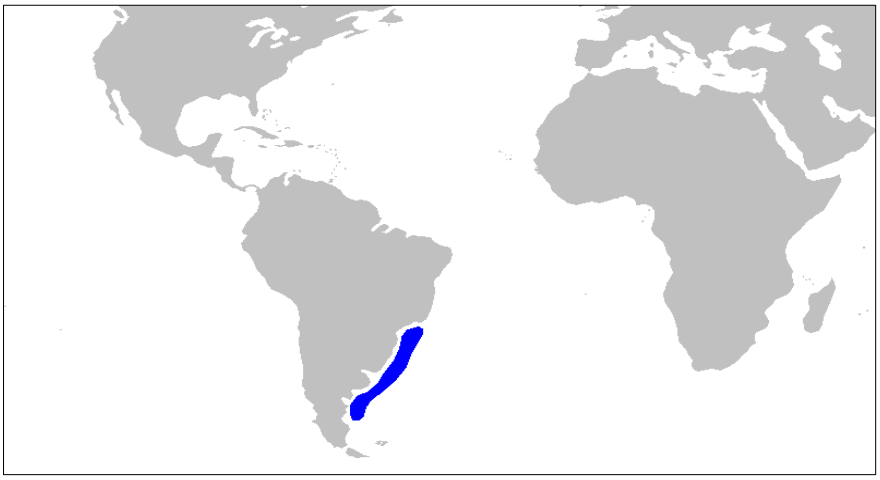


Distribution map of *Squatina australis* REGAN, 1906
Source: www.commons.wikimedia.org

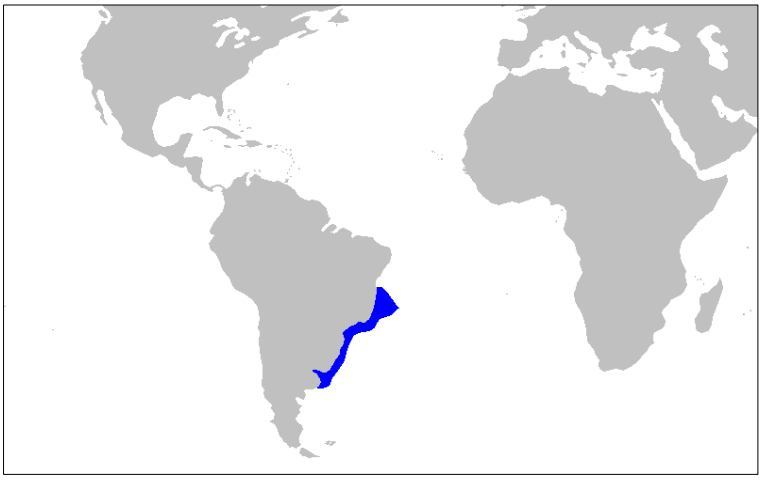


Distribution map of *Squatina africana* REGAN, 1908
Source: www.commons.wikimedia.org

Distribution map of *Squatina tergocellata* McCULLOCH, 1914:
Source: www.commons.wikimedia.org



Distribution map of *Squatina argentina* (MARINI, 1930)
Source: www.nl.wikipedia.org

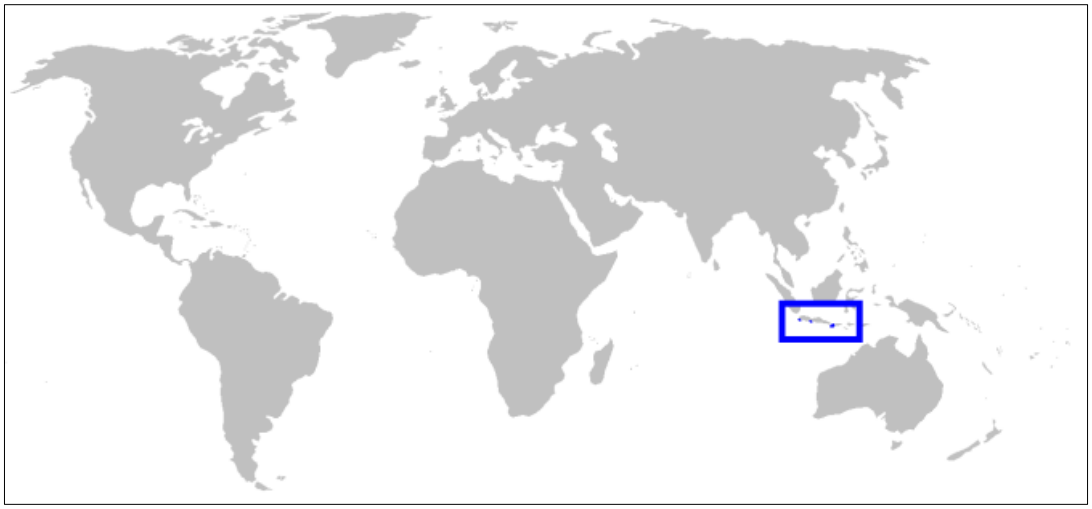


Distribution map of *Squatina punctata* MARINI, 1936
Source: www.commons.wikimedia.org

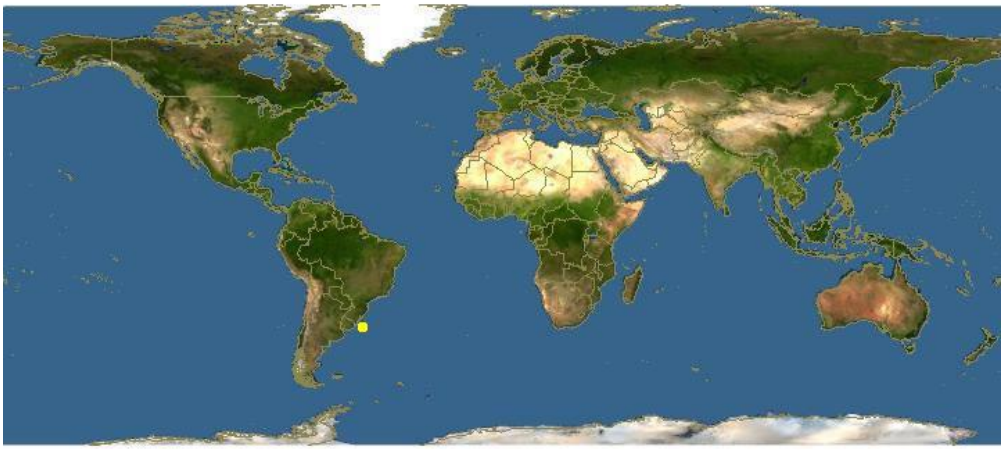
Distribution map of *Squatina guggenheim*
Source: www.nl.wikipedia.org

Distribution map of *Squatina tergocellatoides* CHEN, 1963
Source: www.fr.m.wikipedia.org

Distribution map of *Squatina formosa* SHEN & TING, 1972
Source: www.fr.m.wikipedia.org



Distribution map of *Squatina legnota* LAST & WHITE, 2008
Source: **www.commons.wikimedia.org**



Distribution map of *Squatina occulta* VOOREN & da SILVA, 1992
Source: www.nl.m.wikipedia.org

Distribution map of *Squatina africana* REGAN, 1908
Source: www.nl.m.wikipedia.org

Remarks concerning the last four new taxa

Squatina heteroptera CASTRO-AGUIRRE, ESPINOZA-PEREZ & HUIDOBRO-CAMPOS, 2007 and *Squatina mexicana* CASTRO-AGUIRRE, ESPINOZA-PEREZ & HUIDOBRO-CAMPOS, 2007 remain species represented by a very low number of individuals of scattered populations off the Atlantic coasts of Mexico.

Squatina albipunctata LAST & WHITE, 2008 and *Squatina pseudocellata* LAST & WHITE, 2008 are two species represented by a small number of scattered populations off the Australian coasts, without signification for the Natural History of their Genus.

Additional comments concerning the distribution of the extant Genus *Squatina*

The spatial distribution and the depth range of the diverse extant species of the Genus *Squatina* DUMERIL, 1806 were extensively commented in the chapter concerning the Systematics of the extant taxa attributed to this Genus.

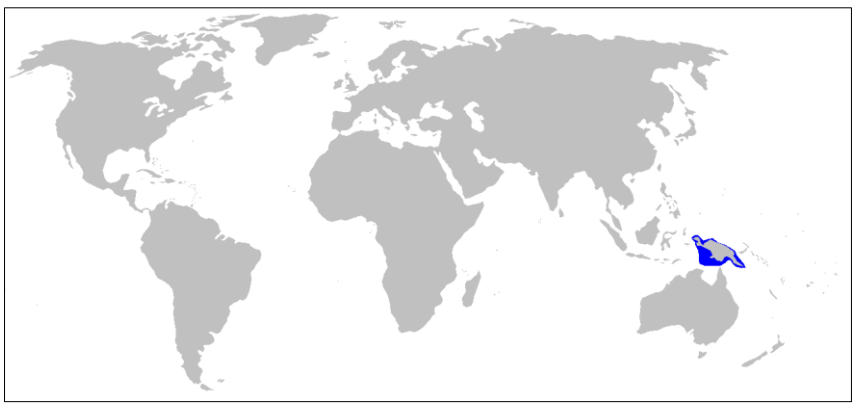
The sole remark which may be added to these considerations is that only the individuals of the type population are really the representatives of their species.

Very rare were, and are, the other individuals attributed to one extant species of the Genus *Squatina* which have been the subject of a deep anatomical or odontological investigation.

Family Hemiscylliidae GILL, 1862
***sensu* HERMAN & VAN WAES, 2014**

Genus *Hemiscyllium* MÜLLER & HENLE, 1837

Distribution map of *Hemiscyllium ocellatum* (BONNATERRE, 1788)
Source: www.nl.m.wikipedia.org

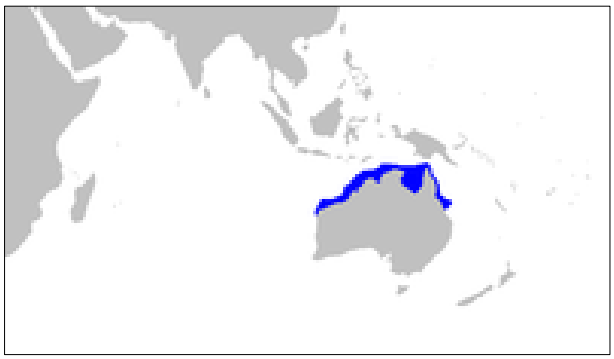


Distribution map of *Hemiscyllium freycineti* (QUOY & GAIMARD, 1824)
Source: www.commons.wikimedia.org

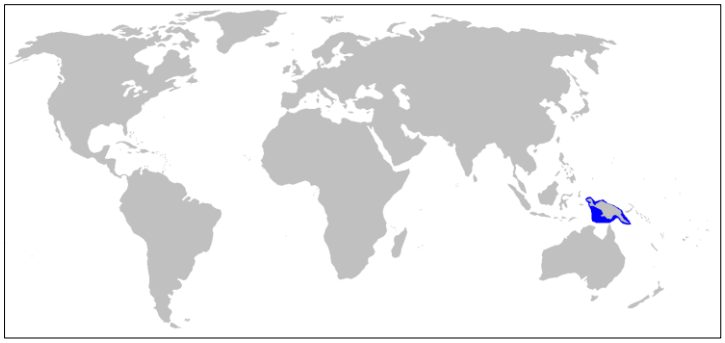
Distribution map of *Hemiscyllium trispeculare* RICHARDSON, 1843
Source: www.fr.wikipedia.org

Distribution map of *Hemiscyllium strahani* WHITLEY, 1967
Source: www.fr.wikipedia.org

Distribution map of *Hemiscyllium galei* ALLEN & ERDMANN, 2008
Source: www.en.wikipedia.org

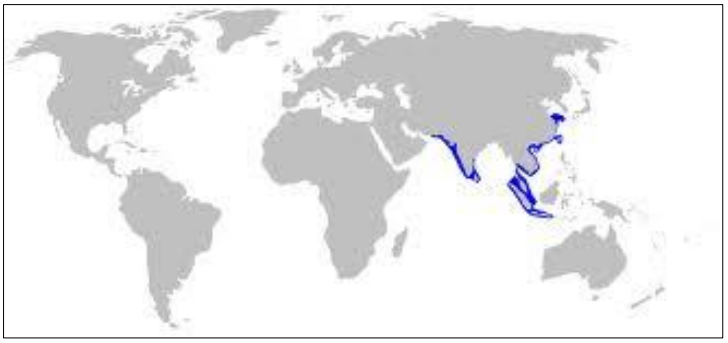


Distribution map of *Hemiscyllium henryi* ALLEN & ERDMANN, 2008
Source: www.en.wikipedia.org



Distribution map of *Hemiscyllium michaeli* ALLEN & DUDGEON, 2010
Source: www.ru.wikipedia.org

Genus *Chiloscyllium* MÜLLER & HENLE, 1837



Distribution map of *Chiloscyllium indicum* (GMELIN, 1789)
Source: www.commons.wikimedia.org

Distribution map of *Chiloscyllium plagiosum* (BENNETT, 1830)
Source: www.commons.wikimedia.org

Distribution map of *Chiloscyllium punctatum* MÜLLER & HENLE, 1838
Source: www.nl.wikipedia.org

Distribution map of *Chiloscyllium griseum* MÜLLER & HENLE, 1838
Source: www.commons.wikimedia.org

Distribution map of *Chiloscyllium hasseltii* BLEEKER, 1852
Source: www.fr.wikipedia.org

Distribution map of *Chiloscyllium caerulopunctatum* PELLEGRIN, 1914
Source: www.fr.wikipedia.org

Distribution map of *Chiloscyllium arabicum* GUBANOV, 1980
Source: www.commons.wikimedia.org

Distribution map of *Chiloscyllium burmensis* DINGERKUS & DE FINO, 1983
Source: www.commons.wikimedia.org

Comments concerning the spatial distribution of the extant representatives of the Family Hemiscylliidae

None of the representatives of the two extant Genera which constitute the Family Hemiscylliidae GILL, 1862 have populations that inhabit certain coasts of the Atlantic Ocean or the Mediterranean Sea.

This observation induces to search their ancestors in the area where they presently live or in other more western areas such as the Near East or Central Europe.

The extinct Genus *Mesiteia* GORJANOVIC-KRAMBERGER, 1885 of which isolated teeth are very common in diverse European levels of Upper Cretaceous to Paleocene Ages is a good example.

The holotype of this Genus is *Mesiteia emiliae* GORJANOVIC-KRAMBERGER, 1885, based on the skeleton of a juvenile specimen discovered in a level of Santonian Age* at Hadjula (northern Lebanon).

*Personal information received from Dr. Fritz Pfeil (München, Germany).

Family Brachaeluridae APPLEGATE, 1974
***sensu* HERMAN & VAN WAES, 2014**

Genus *Brachaelurus* OGILBY, 1907

Distribution map of *Brachaelurus waddi* (BLOCH & SCHNEIDER, 1801)

Genus *Heteroscyllium* OGILBY, 1908

This Genus is only represented by its holotype *Heteroscyllium colclougi* OGILBY, 1908, taxon which regroups some small populations endemic to Australia.

Their populations inhabit diverse restricted areas off the coasts of the Australian sub-continent and each one is isolated from the others by hundreds, if not thousands of kilometres.

The attribution of all these small populations to a single species is based on some anatomical criteria which were never confirmed by odontological or genetic arguments.

Comments concerning the spatial distribution of the extant representatives of the Family Brachaeluridae

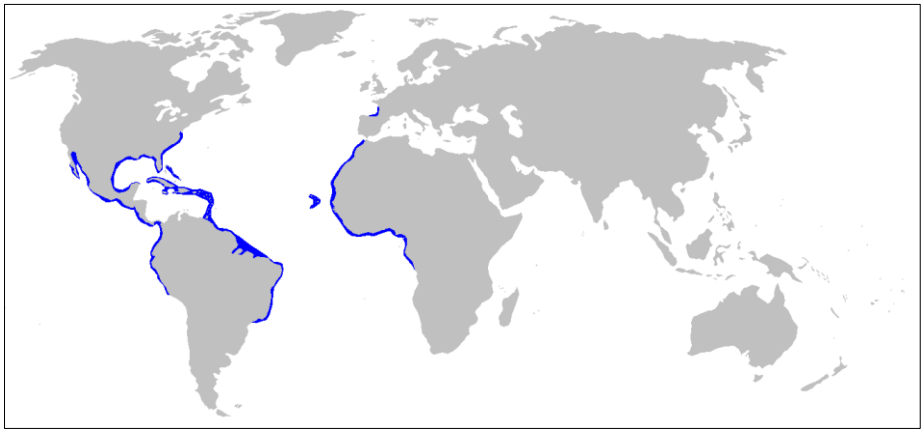
This Family is supposed to have extinct representatives dating from the European Lower Cretaceous Period, but is presently only represented by small populations scattered off the eastern coasts of Australia, where they are considered as species endemic to Australian waters.

Other fossil teeth discovered in Chilean and Peruvian levels of the Pliocene Period were also attributed to the Ge -nus *Brachaelurus*, but the argumentation utilized to justify these attributions requires additional odontological criteria.

The fact that the populations of *Brachaelurus waddi* inhabit areas located a little more southern than the popula-tions of *Heteroscyllium colclougi* allows supposing that these last ones may be considered as their ancestors.

Family Ginglymostomatidae GILL, 1862
***sensu* HERMAN & VAN WAES, 2014**

Genus *Ginglymostoma* MÜLLER & HENLE, 1837



Distribution map of *Ginglymostoma cirratum* BONNATERRE, 1788
Source: www.fr.wikipedia.org

Genus *Nebrius* RÜPPEL, 1837

Distribution map of *Nebrius ferrugineus* LESSON, 1831
Source: www.wikipedia.org

Comments concerning the spatial distribution of the extant representatives of the Family Ginglymostomatidae

The distribution of the numerous and sometimes very dense populations of the single extant species of the Genus *Ginglymostoma* demonstrates that this Genus had colonized both western and eastern coastal waters before the opening of the North Atlantic Ocean.

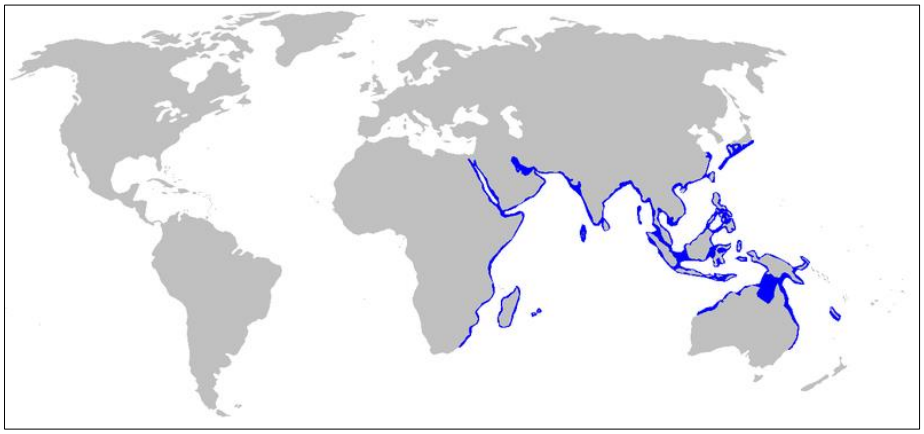
Except for a continuous zone following the western coasts of the American Continent, this Genus is not present more eastern than the Great Pacific Barrier.

The extant populations of *Ginglymostoma cirratum* inhabiting this area were separated from their Atlantic relatives after the completion of the emersion of the Cordilleras de los Andes.

The distribution of the numerous and sometimes very dense populations of the single extant species of the Genus *Nebrius* demonstrates that this Genus, of which fossil teeth have been discovered in European, American, western and northern African deposits of Upper Maastrichtian to Bartonian Ages, abandoned the European coastal waters after the Eocene-Oligocene Transition.

Family Stegostomatidae GILL, 1862
***sensu* HERMAN & VAN WAES, 2014**

Genus *Stegostoma* MÜLLER & HENLE, 1837



Distribution map of *Stegostoma fasciatum* HERMANN, 1783
Source: www.commons.wikimedia.org

Genus *Heteroscyllium* REGAN, 1908

Distribution map of *Heteroscyllium colcloughi* (OGILBY, 1908)
Source: www.nl.wikipedia.org

Comments concerning the spatial distribution of the extant representatives of the Family Stegostomatidae

The fact that the Eocene Genus *Eostegostoma* seems to be the ancestor of the extant Genus *Stegostoma* may explain the present distribution of this Genus.

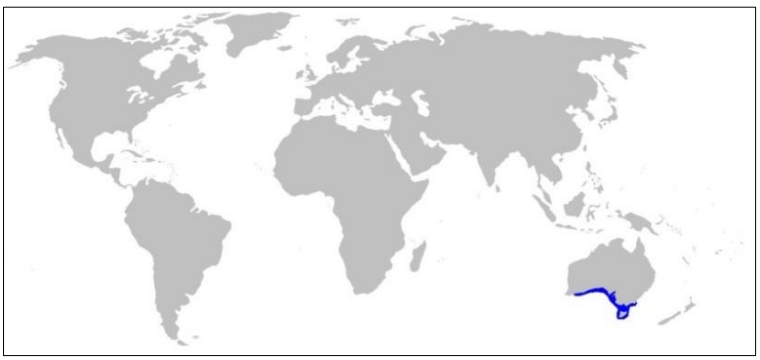
The existence of the diverse populations of *Heteroscyllium colcloughi*, the sole extant representative of the Genus *Heteroscyllium* endemic to Australia, may be explained by a very long isolation of all the populations from its extinct relatives of the Genus *Stegostoma*.

Family Parascylliidae GILL, 1862
***sensu* HERMAN & VAN WAES, 2014**

Genus *Parascyllium* GILL, 1862

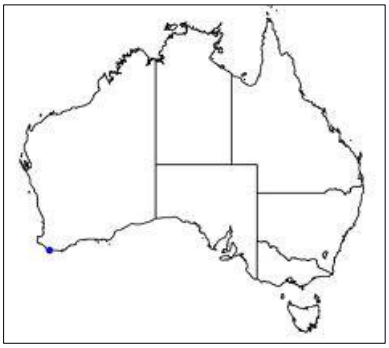
Distribution map of *Parascyllium variolatum* (DUMERIL, 1853)
Source: www.commons.wikimedia.org

Distribution map of *Parascyllium collare* RAMSAY & OGILBY, 1888
Source: www.commons.wikimedia.org



Distribution map of *Parascyllium ferrugineum* McCULLOCH, 1911
Source: www.commons.wikimedia.org

Distribution map of *Parascyllium sparsimaculatum* GOTO & LAST, 2002
Source: www.bie.ala.org.au



Distribution map of *Parascyllium elongatum* LAST & STEVENS, 2008
Source: www.bie.ala.org.au

Genus *Cirrhoscylllium* SMITH & RADCLIFFE, 1913

Distribution Map of *Cirrhoscyllium expolitum* SMITH & RADCLIFFE, 1913
Source: www.commons.wikimedia.org

Distribution map of *Cirrhoscyllium japonicum* KAMOHARA, 1943
Source: www.wikimedia.commons.org

Distribution map of *Cirrhoscyllium formosanum* TENG, 1959
Source: www.commons.wikimedia.org

Comments concerning the spatial distribution of the extant representatives of the Family Parascylliidae

All the populations of the five extant species of the Genus *Parascyllium* are endemic to Australia and only occupy relatively small areas off the southern parts of this sub-continent.

The direct ancestors of these isolated small populations must be Australian extinct Pliocene taxa not yet discovered. Their older ancestors may also be Australian extinct taxa of Miocene or Oligocene Ages.

All the populations of the three extant species of the Genus *Cirrhoscyllium* were discovered in small areas of diverse areas of the western Pacific Ocean.

The direct ancestors of such small isolated populations must be eastern Asian Pliocene taxa not yet discovered and their older ancestors may also be far-eastern Asian unknown taxa.

The relationships of the two extant Genera of this Family with any other Orectolobiformes remain difficult to determine. It is possible that the origin of its lineage is of Lower Cretaceous or even of Upper Jurassic Age.

Family Rhincodontidae MÜLLER & HENLE, 1839
***sensu* HERMAN & VAN WAES, 2014**

Genus *Rhincodon* SMITH, 1829

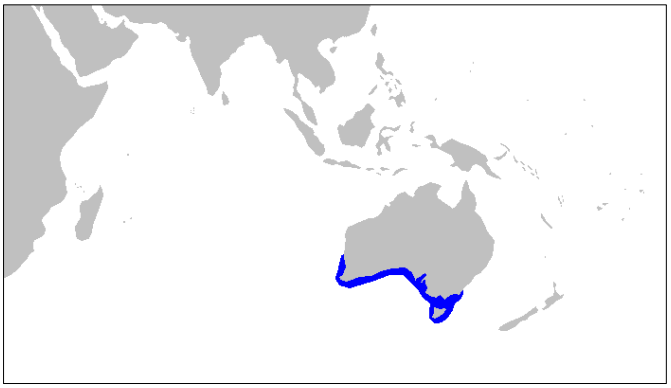
Distribution map of *Rhincodon typus* (SMITH, 1828)
Source: www.nl.wikipedia.org

Comments concerning the spatial distribution the extant representatives of the Family Rhincodontidae

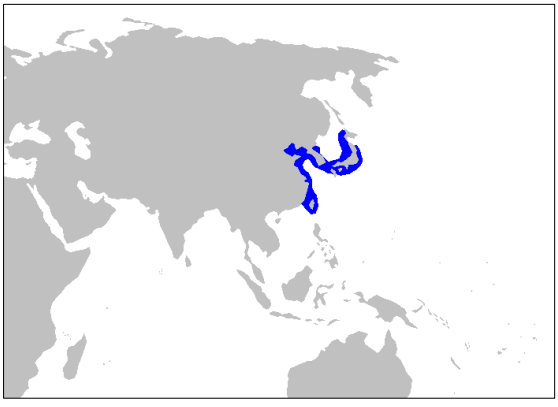
The existence of deep oceanic trenches has no influence on the distribution of these huge nectic filter-feeding Selachii, which had the possibility to extend their expansion continuously since the Eocene Period.

Family Pristiophoridae BLEEKER, 1859
***sensu* HERMAN & VAN WAES, 2014**

Genus *Pristiophorus* MÜLLER & HENLE, 1837



Distribution map of *Pristiophorus cirratus* (LATHAM, 1794)
Source:www.en.wikipedia.org



Distribution map of *Pristiophorus japonicus* GÜNTHER, 1870
Source: www.en.wikipedia.org

Distribution map of *Pristiophorus nudipinnis* GÜNTHER, 1870
Source: www.en.wikipedia.org

Distribution map of *Pristiophorus schroederi* SPRINGER & BULLIS, 1960
Source: www.en.wikipedia.org

Distribution map of *Pristiophorus nancyae* EBERT & CAILLIET, 2011
Source: www.de.wikipedia.org

Distribution map of *Pristiophorus delicatus* LAST & WHITE, 2008
Source: www.de.wikipedia.org

The last species discovered of this Genus is *Pristiophorus lanae* EBERT & WILMS, 2013. This species is represented by numerous populations inhabiting diverse islands of The Philippines.

All these populations seem to have narrow relationships, but there exists no comparative study of their dentition.

Comments concerning the spatial distribution of the extant representatives of the Family Pristiophoridae

Numerous populations of the extant species *Pristiophorus schroederi* SPRINGER & BULLIS, 1960 inhabit off the coasts of Cuba and the Bahamas Islands.

All the individuals caught off the northern coasts of Cuba and off the Bahamas Islands, which the senior-author had the possibility to examine, present similar odontological characteristics, fact which justifies their attribution to the same taxon.

As the senior-author never had the possibility to examine individuals living off the southern coasts of Cuba he has no authority to guarantee that these ones are also representatives of *Pristiophorus schroederi*.

The individuals of *Pristiophorus schroederi* are the sole extant representatives of this Genus in the North Atlantic Ocean and live only on the western side of this Ocean.

Numerous populations of this Genus are thriving off the Japanese, Chinese and Taiwan coasts. All these populations are included in the taxon *Pristiophorus japonicus* GÜNTHER, 1870.

The dentition of the diverse populations of individuals caught off the Japanese coasts, which the senior-author had the possibility to examine, presents the same odontological characteristics.

It would be interesting to know if the dentition of all the Chinese and Taiwan populations presents the same odontological characteristics.

Three groups of populations of this Genus, considered as distinct species are endemic to southern Australia. This means that they were isolated from their plausible Sino-Japanese relatives millions of years ago.

The Genus *Pristiophorus* includes also three small populations separated by thousands of kilometres across the Indian Ocean. These are attributed to a single species: *Pristiophorus nancyae* EBERT & CAILLIET, 2011.

A control of their degree of relationships is necessary to guarantee that they really are representatives of only one species.

Additional data concerning fossil representatives of the Family Pristiophoridae

Pristiophorus striatus UNDERWOOD & SCHLÖGEL, 2012

Numerous isolated oral teeth in possession of a dental crown presenting a short apron and strong extern basal striations discovered in a level of Burdigalian Age (Lower Miocene) in the Vienna Basin were attributed to the Genus *Pristiophorus* MÜLLER & HENLE, 1837.

The very strong and elongated basal ornamentation of the dental crown of these oral teeth allows supposing that they could be attributed to a deep-water survivor of the Genus *Propristiophorus* WOODWARD, 1932.

The single extinct species known of this Genus is *Propristiophorus tumidens* WOODWARD, 1932 of Cenomanian Age. It is represented by two skeletons discovered at Hadjula (northern Lebanon).

This species lived in a coastal environment.

If *Pristiophorus striatus* may be reconsidered as a representative of the Genus *Propristiophorus*, the survivor of this Upper Cretaceous taxon to the Lower Miocene is a surprising but logical discovery.

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HERMAN, J. & VAN WAES, H. 2014: Observations concerning the Evolution and the Parasystematics of all the living and fossil Chlamydoselachiformes, Squatiniformes, Orectolobiformes, and Pristiophoriformes, based

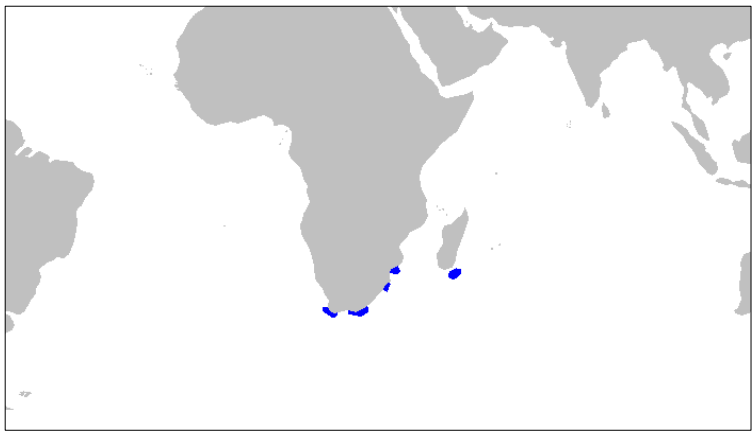
on both biological and odontological data. Suggestion of a possible origin of the Order Pristiophoriformes, of the Order Ganopristiformes and a global Synthesis of the previous Systematics proposals. *Géominpal Belgica.* **6**: 346 pp., incl. 75 pls.

UNDERWOOD, C., J. & SCHLÖGEL, J. 2012: Deep-water chondrichthyans from the Early Miocene of the Vienna Basin. *Acta Paleontologica Polonica*. **58(7)**: 487-581.

WOODWARD, A., S. 1932: A Cretaceous pristiophorid shark. *Annals and Magazine of Natural History*. (Series 10). **10**: 476-479, pl. 18.

Family Pliotrematidae HERMAN & VAN WAES, 2012
***sensu* HERMAN & VAN WAES, 2014**

Genus *Pliotrema* REGAN, 1906



Distribution map of *Pliotrema warreni* REGAN, 1906
Source: www.en.wikipedia.org

Comments concerning the spatial distribution of the extant representatives of the mono-generic Family Pliotrematidae

The mono-specific Genus *Pliotrema* regroups five isolated populations of *Pliotrema warreni* inhabiting small areas of the South African coasts and one population discovered off the south-eastern coasts of Madagascar.

This species is based on two Syntypes preserved in the Ichthyologic Collections of the B.M.N.H. (London, England), caught off the South African coasts (Cape of Good Hope and Natal), which allows supposing that the four extant South African populations of this rare species have narrow relationships.

No observation concerning the specimens caught off Madagascar allows supposing that they possess different genetic codes.

They differ from their South African relatives only by some details such as the possession of a slightly longer ros -trum and a lighter coloration.

These delicate morphological differences may result from their very long separation from their African relatives.

But considering that the separation of Madagascar from Africa was initiated circa 160 million years ago, only a control of their genetic code could confirm that the Madagascar population may be attributed to the taxon *Pliotrema warreni* REGAN, 1906.

General conclusions

After having minutely examined the distribution maps officially proposed by diverse sources, for all the extant specific taxa of the eight following former Orders: Order Chlamydoselachiformes, Order Echinorhiniformes, Order Hexanchiformes, Order Heptranchiformes, Order Orectolobiformes, Order Hemiscylliiformes, Order Stegostomatiformes and Order Pristiophoriformes, it seems obvious that all these maps require a complete revision.

Basic Principle

One extant species is always based on one holotype or one type-set. This holotype or this set generally* has one precise origin and is a representative of one of the diverse populations constituting this species.

*The origin of the ones discovered on fish-markets is impossible to determine before catches of similar individuals were realized on positions of which the localization is well known.

To be sure that one extant species may include all the different populations that are attributed to it, the anatomical and odontological characteristics of some individuals of each of these populations must be determined.

Except for the description of a new taxon, all the other attributions are generally based on lists of the local fauna anterior to the description of this new taxon.

All the benthic Chondrichthyes* inhabit more or less selected areas. This selection is in function of the nature of the sea-bottom, the salinity and the temperature of the water and the actions of sea-bottom's currents.

*But also all the other benthic Fishes.

These last reflections suggest that numerous unknown species exist. Some of these surely have specimens waiting for a new label in diverse extant Ichthyologic Collections.

Other implication

The same approach could be used for all the benthic invertebrates.