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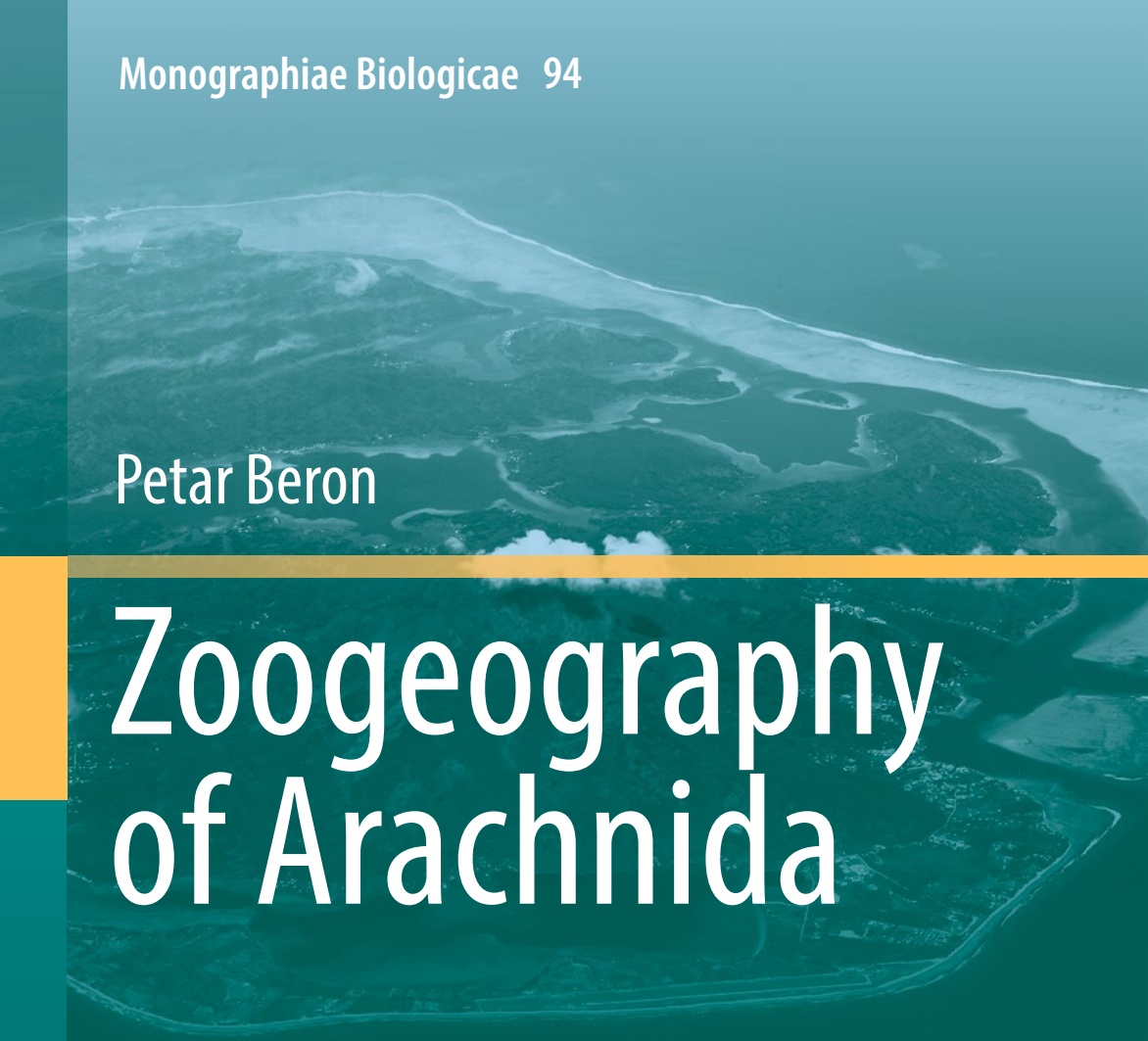

Petar Beron

# Zoogeography of Arachnida

Springer

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Petar Beron

# Zoogeography of Arachnida

Springer

Petar Beron
National Museum of Natural History,
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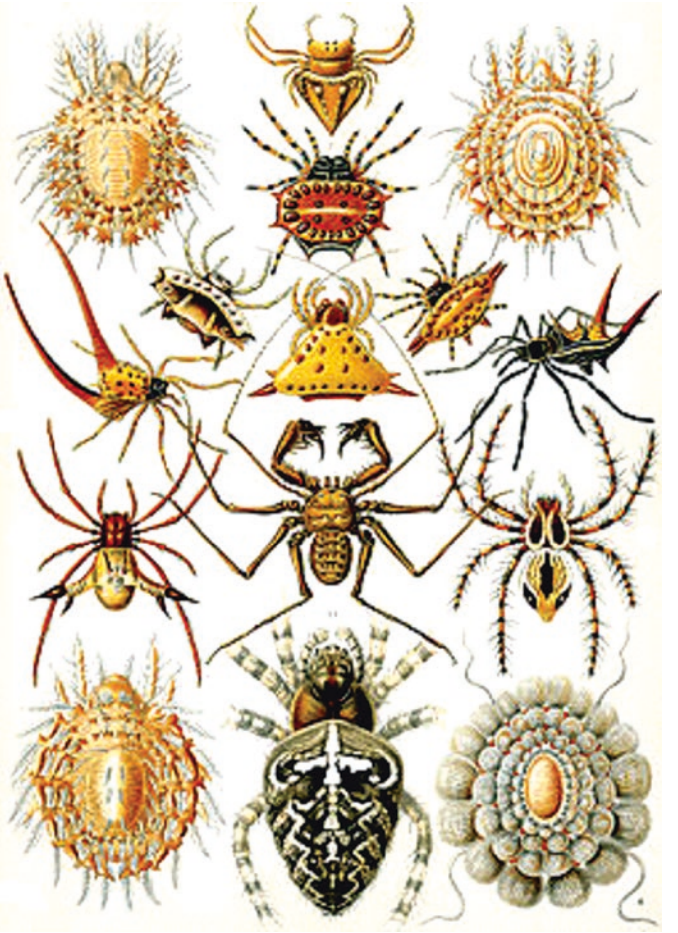

E. Haeckel, Kunstformen der Natur, 1904

*"One of the primary suppositions of sciences is that world is orderly, that there are patterns, and that patterns need causal explanation. The same can be said of the science of historical biogeography."*
J. Cracraft (1988)

*To the memory of Vassil B. Guéorguiev*
*Bulgarian entomologist, biospeleologist, and zoogeographer, for our friendship and his ideas*

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# Chapter 1
# Introduction

**Abstract** The classical zoogeographical subdivision of the land fauna, done by Sclater and Wallace in the nineteenth century, is still "official" in our time. This subdivision has been based on vertebrates, mostly mammals and birds. The ocean of tiny creatures (insects, arachnids, etc.) has been (and still is) largely neglected. Some attempts have been done to restructure the old scheme (Lopatin, Krizhanovskiy, Morrone, etc.), but nothing has been done for the total of Arachnida – old groups of non-flying invertebrates, quite important for zoogeography and already relatively well known.

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By venturing into this mammoth task, to put together the information about all orders in Arachnida and to elaborate on their distribution could be explained (besides with my long experience as a lecturer of zoogeography) with the words of one of the prominent arachnologists of our time, the Brazilian Adriano Kury "In a moment of deprivation of common sense" (Kury, on line). Quot potui – feci!

Some 60 years ago, such analysis would have been much more incomplete, much more difficult, and on completely different bases. Since the middle of the twentieth century, so many new descriptions have appeared, revisions on the whole cladistics taxonomy and zoogeography, so we have now a picture much closer to reality. At the same time, the huge amount of information became very hard to digest, especially for a single analyzer. It is fortunate that some competent specialists provided catalogues, bibliographies, and checklists of whole groups of Arachnida and of particular countries or regions. We must mention some (not all) of these very helpful arachnological manuals, published in the twentieth and twenty-first centuries:

The "smaller orders": Harvey (2003)
Palpigradi: Kraepelin (1901), Rowland and Sissom (1980), Condé (1996)



P. Beron, *Zoogeography of Arachnida*, Monographiae Biologicae 94,
https://doi.org/10.1007/978-3-319-74418-6_1

Schizomida: Harvey (1992), Reddell and Cokendolpher (1995)
Amblypygi: Mullinex (1975), Quintero (1981 1986)
Thelyphonida (Uropygi): Rowland and Cooke (1973)
Ricinulei: Tuxen (1974)
Solifugae: Kraepelin (1901), Gromov and Savary (Bibliography on line)
Scorpiones: Fet, Sissom, Lowe and Braunwalder (2000)
Pseudoscorpiones: Chamberlin (1931), Beier (1932a 1932b 1963), Harvey (1990 1992), Schawaller (1980, bibliography)
Opiliones: Roewer (1923), Rosas Costa (1950 – Cyphophthalmi), Hallan (2005, checklist), Cokendolpher (1997, bibliography), Giribet (2000, Cyphophthalmi), Kury (2003, catalogue New World Laniatores; 2012, description of catalogues and checklists), Pinto-da-Rocha, Machado and Giribet (Eds.) (2007), Schönhofer (2013, Dyspnoi)
Araneae: Roewer (1942), Brignoli (1983), Platnick (The World Spider Catalog)
Opilioacarida: Hammen van der (1966), Beron (2014)
Holothyrida: Beron (2014)
Prostigmata: Beron (2008b, 2016)
Mesostigmata: Beron (2016)
Regional lists and bibliographies:
Old World: Beron (2008a, high altitude Arachnida)
New World: Kury (2003, Opiliones Laniatores)
Africa: Dupré (2013, Scorpiones), Lamoral and Reynders (1975, Scorpions, Ethiopian Region), Scharff (1990, Linyphiidae), Starega (1984, Phalangiidae; 1992, African Opiliones, except Phalangiidae)
East Africa: Probst (1973, Scorpiones)
South Africa: Lawrence (1931, Opiliones; 1955, Solifugae, Scorpiones and Pedipalpi, Schizomida, 1969), Kauri (1961, Opiliones), Lotz (2009 – Opiliones)
Madagascar: Lawrence (1959, Opiliones), Lourenço (1996, Scorpiones)
Australia: Forster (1955 and further), Glauert (1963, Scorpiones, W. Australia), Koch (1977, Scorpiones, Australia and Papua), Harvey (1992)
Europe: Beier (1963, Pseudoscorpiones), Stol (1993, 2007, Opiliones, North Europe), Deltshev and Blagoev (2001, Araneae, Bulgaria)
North America: Hoff (1958, Pseudoscorpiones), Cokendolpher and Lee (1993, Opiliones)
Texas: Rowland and Reddell (1976, Texas)
South America: Benavides and Giribet (2007, Opiliones Neogoveidae), Mello-Leitão (1945, Scorpiones), Kury (2003, Laniatores), Caporiacco (1948, Guianas, Opiliones), Ringuelet (1959, Argentina, Opiliones)
West Indies: Cokendolpher and Camilo-Rivera (1989, Opiliones, bibliography)
Mexico: Díaz Nájera (1975, Araneae), Kury and Cokendolpher (2000, Opiliones), Vazquez Rojas (1981 – Solifugae)
Madagascar: Emerit (1974, Araneae, Gasteracanthinae), Lawrence (1959, Opiliones), Lourenço (1996, Scorpiones), Araneae (Goodman and Benstead 2005)

New Zealand: Forster (1967–1973, Araneae; 1978, Opiliones), Dumbleton, 1953, Heath, 1977 (Ixodida)
Oceania: Chamberlin (1934)
Chile: Cekalovic (1975, Solifugae; 1976, Arachnida; 1983, Scorpiones; 1984, Pseudoscorpiones and Palpigradi; 1986, Opiliones), Beier (1964, Pseudoscorpiones)
Northern Asia: Eskov (1994, Linyphiidae); Fet (1988, Scorpiones, the former USSR); Marusik, Eskov, and Kim (1992, Araneae); Mikhailov (1998 1999 2000 2002 2013, Araneae, the former USSR); Staręga (1978 – Opiliones of the former USSR)
Panama: Fairchild et al. (1966 – Ixodida)
Neotropical Region: Guglielmone et al. (2003, Ixodida)
Georgia: Djaparidze (1960 – Ixodida)
India: Murthy and Ananthakrishnan (1977, Pseudoscorpiones), Pocock (1900, Arachnida), Siliwal, Molur and Biswas (2005, Araneae), Tikader (1987, Araneae)
Nepal: Clifford et al. (1975, Ixodida)
Iran: Abassian-Lintzen (1960, Ixodida), Mozaffarian and Marusik (2001, Araneae)
Arachnida: Blick, Hänggi, and Thaler (2002, Germany, Switzerland, Austria, Belgium, and the Netherlands), Maes et al. (1989, Nicaragua), Zaragoza (2007 – Iberian Peninsula)
Palpigradi: Kraepelin (1901), Rowland and Sissom (1980), Condé (1996)
Solifugae: Aliev and Gadzhiev (1983, Azerbaydjan), Armas and Teruel (2005, Cuba), Gromov and Savary (bibliography), Levy and Shulov (1964, Israel)
Schizomida: Armas 2004 (Cuba, Dominican Rep.), Harvey (1992, 2000, Australia; 2001, Seychelle Isl.); Reddell and Cokendolpher (1995)
Amblypygi: Armas (2004, 2009b, Antilleans), Mello-Leitão (1931, Brazil)
Thelyphonida (Uropygi): Mello-Leitão (1931, Brazil)
Ricinulei: Tuxen (1974, Africa)
Scorpiones: Acosta and Maury (1998, Argentina); Acosta and Ochoa (2002, Bolivia); De Armas (2009a, Antilleans); Fet (1988, former USSR; 1994, Tukmenistan; 2010, Europe); Koch (1977, Australia); Lamoral (1979, Namibia); Levy and Amitai (1980, Palestina); Lourenço and Méndez (1984, Panama); Lourenço (1995a, Ecuador; 1996, Madagascar; 1997, Colombia); Maury (1984, Paraguay); Mello-Leitão (1932, Brazil); Zhu, Qi, and Song (2004, China); Ojanguren-Affilastro (2005 – Argentina)
Pseudoscorpiones: Agnarsson (1998, Iceland); Beier (1932, 1965a, New Guinea; 1966, Philippines); Chamberlin (1934, Oceania); Ćurčić (1974, Yugoslavia); Ćurčić, Dimitrievi ć, and Legakis (2004, Serbia, Montenegro, Macedonia); de Lessert (1911, Switzerland); El-Hennawy (1988, Egypt); Gardini (2000, Italia); Harvey (1990); Kunt (2008, Turkey); Legg and O'Connor (1997, Ireland); Mahnert (1981–1988, Kenya; 1975, Malta; 2004, Austria); Petrov (1997, Bulgaria); Schawaller (1980, bibliography; 1994b, Thailand; 1995, China); Telnovs (2002a, Latvia); Zaragoza (2000, bibliography, Iberian Peninsula, Baleares, Macaronesia); Legg (1988, Great Britain); Murthi and Anasnthakrishnan (1977, India)

Opiliones: Agnarsson (1998, Iceland); Babalean (1992, Romania); Bayram et al. (2010, Turkey); Bezdecka (2008, Czech Republic); Blick and Komposh (2004, Central and Northern Europe); Canals (1936, Chile); Cawley (2002, Ireland); Chevrizov (1980, URSS); Cokendolpher (1990, Egypt); Cokendolpher and Camilo-Rivera (1989, West Indies); Cokendolpher and Lee (1993, Greenland, Canada, USA, Mexico); Gritzenko (1978, Asian part of USSR); Forster (1954, New Zealand); Hillyard and Sankey (1989, British Fauna); Kim, D.-H., J.-W. Lee, and J.-P. Kim (2006, Korea); Klimeş (2000, Czech and Slovak Rep.); Komposch (2004, Hungary); Komposch and Gruber (2005, Austria); Lawrence (1959, Madagascar); Lotz (2009, Southern Africa); Martens (1978, Germany; many papers, Nepal); Mheidze (1964, Georgia); Novak (2004, Croatia; 2005, Bosnia and Herzegowina); Novak et al. (2006, Slovenia); Prendini (2010, Seychelles); Rafalski (1960, 1961, Poland); Rafalski and Staręga (1997, Poland); Rambla (1967, Portugal); Redikorzev (1936 – Soviet Union); Ringuelet (1959, Argentina; 1963, Uruguay); Roewer (1923); Shavanova (2004, Belarus); Šilhavý (1956, Czechoslovakia); Staręga (1976, Bulgaria; 1978, Soviet Union; 1992, Afrotropical Region; 2000, Poland); Suzuki (1985a, 1985b, Thailand); Telnovs (2002b, Latvia); Tsurusaki (1993, Japan)

Araneae: Aakra and Hauge (2000, 2003, Norway, Svalbard, Jan Mayen); Agnarsson (1996, Iceland); Bosmans (2009, Belgium); Bosmans and Chadzaki (2005, Greece); Bosmans and de Keer (1985, Pyrenees); Blagoev (2002, Macedonia); Bonnet (1945–1961, bibliography); Brignoli (1983); Cardoso and Morano (2010, Iberian Peninsula); Deltshev (2005, Bulgaria); Deltshev and Blagoev (2001, Bulgaria); Deltshev, Curčić, and Blagoev (2001, Serbia); Drensky (1936, Balkan Peninsula); Evenhuis (2006, Fiji); Forster et al. (1967–1973, New Zealand); Forster and Forster (1973, New Zealand), Gajdos, Svaton, and Sloboda (1999, Slovakia); Kim (1990, Korea); Kostanjšek and Kuntner (2015, Slovenia); Larsen and Scharff (2003, Greenland); Le Peru (2007, France); Marinu and Verneau (2002, Corsica); Marusik, Eskov, Logunov, and Basarukin (1993, Sakhalin and Kuril Isls); Marusik, Eskov, Koponen, and Vinokurov (1993, Yakutia); Kronestedt (2001, Sweden); Marusik, Logunov, and Koponen (2000, Tuva); Merrett, Locket, and Millidge (1985, Great Britain); Mikhailov and Fet (1994, Turkmenistan); Mikhailov (1997, 1998, 1999, 2000, 2002, 2013, the former Soviet Union); Milosević (2002, Croatia); Nikolić and Polenec (1981, f. Yugoslavija); Platnick (2000–2011. The World Spider Catalog, Version 11.5.); Proszynski and Staręga (1971, Poland); Relys and Spungis (Latvia); Roewer (1942); Song, Zhang, and Daigin (2002, Singapore); Starega (2000, Poland); Suman (1964, Hawaii), Tikader (1970, Sikkim); Topcu, Demir, and Seyyar (2005, Turkey); Varol (2003, Turkey); Vilkas (1992, Lithuania); Weiss and Urak (2000, Romania)

Opilioacarida: Beron (2014), Vasquez and Klompen (2002, North and Central America; 2010, Madagascar)

Holothyrida: Beron (2014), Lehtinen (1995)

Ixodida: Drensky (1955, Bulgaria), Feider (1965, Romania), Filippova (1966, Argasidae of the World), Starkoff (1958, Ixodida of Italy), Georgieva and

Gecheva (2013, Ixodidae of Bulgaria), Gregson (1956, Ixodida of Canada), Anastos (1950, Ixodida of Indonesia), Roberts (1964, Ixodida of Tasmania; 1970, Ixodida of Australia), Dumbleton 1953, Heath 1977 (Ixodida of New Zealand), Hoogstraal (1953, Ixodida of Madagascar)
Prostigmata: Beron (2008a – Calyptostomatoidea and Erythraeoidea of the world)
Oribatida: Shtanchaeva 2003 (Caucasus), Collof and Haliday 1998 (Australia), Bayartogtokh 2010 (Mongolia), Vu Quang Manh (Vietnam)

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Czech Rep. – J. Buchar, M. Daniel, F. Kovařik, J. Kratochvil, M. Krumpál, V. Šilhavý
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Belgium – P. Benoit, R. Bosmans, A. Fain, R. Jocqué
Netherlands – L. van der Hammen
Austria – M. Beier, E. Christian, J. Gruber, H. Franz, C. Komposch, H. Schatz, K. Schmölzer, K. Thaler, H. Janetschek
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Kazakhstan – A.V. Gromov
Georgia – D. Kobakhidze
Iran – A. Saboori
Turkey – K.B. Kunt

United States – E. Benedict, J.C. Chamberlin, J.C. Cokendolpher, J. Cracraft, V. Fet, O.F. Francke, G. Giribet, J.L. Gressitt (Hawaii), C. C. Hoff, C. and M. Goodnight, F. Howarth (Hawaii), H. Hoogstraal, E. Mayr, R.W. Mitchell, W.B. Muchmore, M. Muma, N. Platnick, L. Prendini, J.R. Reddell, J. M. Rowland, P.A. Selden, W. Shear
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Philippines – L. Corpuz Raros
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South Africa – R.F. Lawrence, H. Martin
Israel – F.D. Por

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# Chapter 2
# Builders of Arachnology

**Abstract** In many older authors (Aristotle and others), we can find information about spiders, scorpions, and other Arachnida. The scientific studies however started with the paper of Clerck (1757), the only one recognized as valid before the system of Linnaeus (1758).

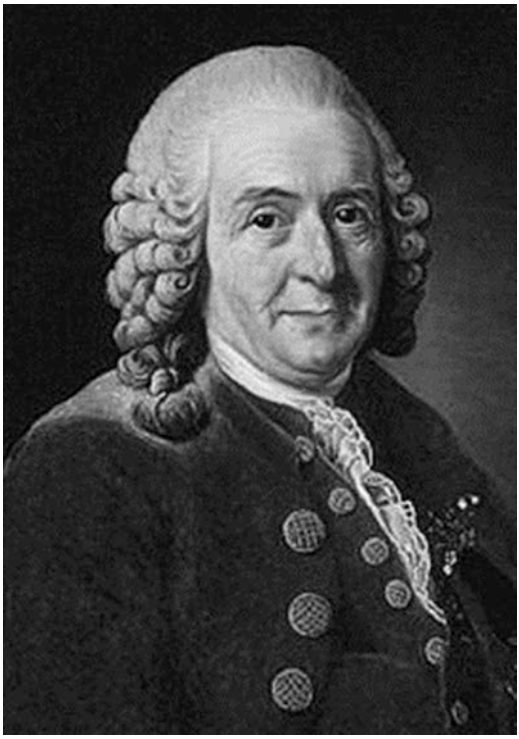
In many older authors (Aristotle and others), we can find information about spiders, scorpions, and other Arachnida. The scientific studies however started with the paper of Clerck (1757), the only one recognized as valid before the system of Linnaeus (1758). Before trying to discuss the zoogeographical problems of Arachnida, we owe a tribute to the builders of the arachnology by saying a few words about the life of some (by no means all) founding fathers. Some of them (Beier, Vachon, Brignoli, Kratochvil, Hadži) were known personally to the present author. To the correspondence with others (Chamberlin, Lawrence, Šilhavý, Suzuki, all other "living classics"), he owes much of his devotion to arachnology.

**Clerck, Carl** (1709–1765) – the names in his paper of 1757 *Svenska Spindlar* were recognized as valid, and it is the oldest recognized paper in the zoological nomenclature. It started the scientific study of Arachnida. Presently, 53 spider species carry names given by Clerck.



P. Beron, *Zoogeography of Arachnida*, Monographiae Biologicae 94,
https://doi.org/10.1007/978-3-319-74418-6_2

**Linnaeus, Carolus (Carl von Linné)** (1707–1778) – professor of medicine and botany at Uppsala (Sweden) and founder of the system of plants and animals (Systema Naturae, Ed. X, 1758)



C. Linnaeus (Portrait by A. Roslin, 1775)

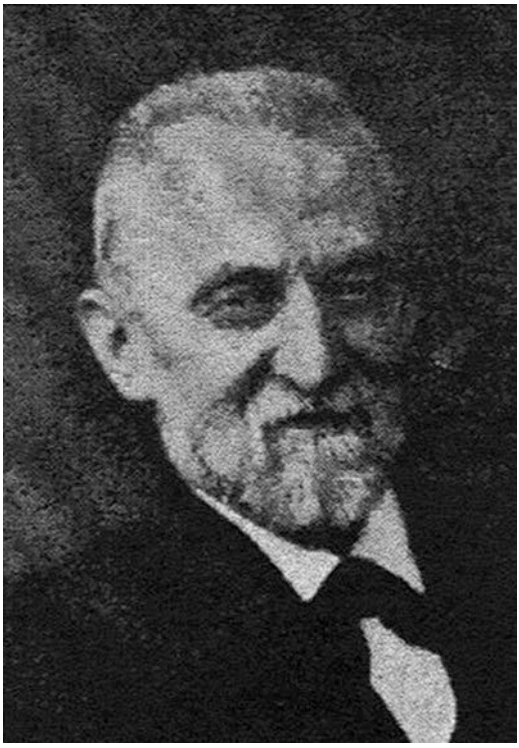
**Thorell, Tord Tamerlan Theodor** (1830–1901) – born in Sweden but lived long-time in Genoa and author of numerous important contributions to the system of Arachnida (On European spiders, 1869; Synonym European spiders, 1870–1873, many papers with descriptions of new taxa from Malaysian and Papuan collections, Arctica, Cameroon, etc.). Thorell described 12 families of spiders (Ctenizidae, Theraphosidae, Palpimanidae, Hersiliidae, Uloboridae, Oxyopidae, Amaurobiidae, Zodariidae, Philodromidae, etc.). Important papers are devoted also to Opiliones (13 publications on Opiliones from SE Asia, Indonesia, Burma, Argentina, USA, Europe, and West Asia).

T.T.T. Thorell

**Sørensen, William Emil** (1848–1916) – Danish arachnologist. Described 157 valid species of Opiliones. Some important papers are as follows: 1898, *Arachnida Groenlandica (Acaris exceptis)*; 191, *Opiliones (in I. Sjostedt's Kilimanjaro – Meru volumes)*; and 1932, *Descriptiones Laniatorum*.

William Emil Sørensen (1848–1916)

**Hansen, H.J.** (1855–1936) – Danish arachnologist. Some important papers: Hansen & Sorensen (1904) – established the modern system of Opiliones; Described many new taxa in Arachnida.

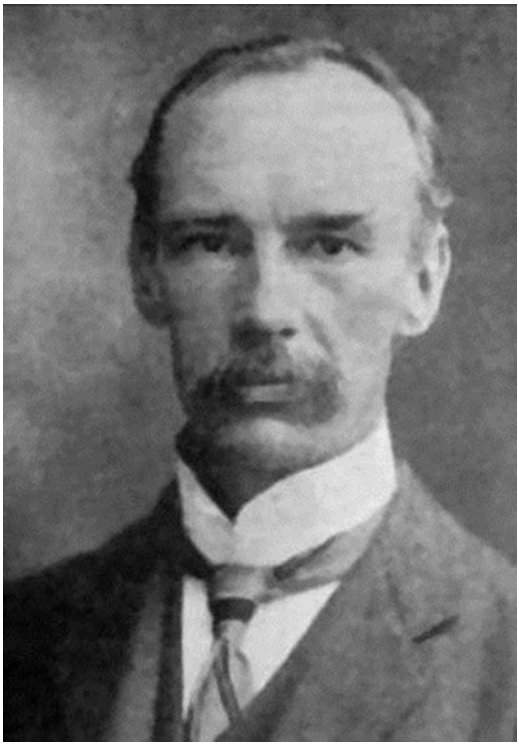


Hans Jakob Hansen

**Mello-Leitão, Cândido Firmino de** (1886–1948) – Brazilian arachnologist, professor, and explorer of Opiliones (198 publications, describing 347 valid species), Uropygi, Amblypygi, Scorpiones, Araneae, and some smaller orders in Brazil. Some important papers were *Pedipalpos do Brasil e algumas notas sobre a ordem* (1931), *Opiliões do Brasil* (1932, 511 pp.), *Escorpiães Sul-Americanos* (1945, 468 pp.), and others.

Cândido Firmino de Mello-Leitão

**Pocock, Reginald Innes** (1863–1947) – English arachnologist and curator of the collections of Arachnida and Myriapoda from 1885 to 1904. Author of many papers on various groups of Arachnida.



R.I. Pocock (From P. Bonnet, 1945)

**Kraepelin, Karl Matthias Friedrich Magnus** (1848–1915) – German arachnologist, worked in the Zoology Museum in Hamburg, and author of many descriptions of various groups of Arachnida. Among the publications of Kraepelin are a volume on *Palpigradi and Solifugae* in Das Tierreich and many others.

Karl Kraepelin