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AMERICAN ENTOMOLOGIST Feature Article

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Founding Contributions of Count Carl Gustaf Mannerheim (1797-1854) to the Understanding of Beetles (Coleoptera) in Pacific Northwestern America.

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Abstract. The first comprehensive investigation of the Coleoptera of western North America was compiled in the mid-19th century by the avid Finnish coleopterist, Carl Gustaf Mannerheim. He published 40 scientific papers over 30 years, including his “magnum opus”, a four-volume taxonomic treatment of beetles from what was then called Russian America (coastal Alaska and northern California). In these four monographs (1843, 1846, 1852, 1853) Mannerheim organized information about the 540 species then known from that area. Mannerheim and his Finnish colleague, Frederik Mäklin (1821-1883), respectively, described 214 and 87 of these species as new to science. Johann Friedrich von Eschscholtz, whose work preceded Mannerheim’s by about 20 years, had described another 105 of these species, and thus these three men collectively accounted for c. 75% of the species recognized at that time in the earliest systematic study of the fauna. Mannerheim’s research was prompted by global forces of imperial hegemony and involved unstinting contributions of many dedicated Finns who directed a river of specimens from the wilds of the Pacific Northwest to Mannerheim’s world-class collection. This collection exists today as Coleoptera Mannerheim, a valuable resource at the Finnish Museum of Natural History, University of Helsinki (LUOMUS)). His enduring work is testimony to a lifelong, consuming passion for beetles and clearly places Mannerheim among the founders of coleopterology in western North America.

Key words: beetles, Coleoptera, Alaska, California, Finland, Russia, collections

Legacies of European Empires Intersect in America

For about 100 years, until 1867, present day Alaska was claimed by the Russian Empire and known as “Russian America”. Lucrative fur trading (especially in sea otters and fur seals), coal mining, and fishing were the principal economic drivers of settlement. Russian influence was mainly restricted to coastal areas where Sitka (then known as New Archangel) was the capital of the region from the beginning of 19th century. Parts of northern California were also claimed 1812-41, with Fort Ross, 90 miles north of present day San Francisco, serving as the stronghold (Naske and Slotnick 1979). Russia ultimately sold its American empire in response to the lingering, and financially crippling consequences of its losses in the Crimean War (1853-1856).

(Insert Figure 1)

In the earlier territorial war of 1808-1809 between the expanding Russian and receding Swedish empires, Finland was ceded and annexed to Russia as the autonomic Grand Duchy of Finland. During 500 years under Swedish authority, Finns had acquired considerable experience and expertise in seafaring and naval warfare. Consequently, Finnish ships, naval officers and sea captains soon assumed important roles in the Russian empire, particularly in exploration and administration of the Alaskan frontier. For example. two Finnish admirals, Arvid Adolf Etholén (1799-1876) and Hampus Furuhjelm (1821-1909) served as Governor Generals of Russian America. A vibrant and predominantly Finnish settlement developed (Viljamaa 1977), and Finns, given years of Swedish influence in natural history, became the region’s pioneering naturalists and geologists, cataloguing the natural bounty of Russian Alaska, rather like “apostles of Linnaeus”.

In addition to his mentor and friend Carl Reinhold Sahlberg (1811-1874) and his son Reinhold Ferdinand Sahlberg (1811-1847), the most notable

Finnish entomologist of the day was Count Carl Gustaf Mannerheim. Mannerheim dedicated himself to completing the Russian American beetle inventory started by his short-lived contemporary, Johann Friedrich von Eschscholtz (1793-1831). In this work, the Count deftly enlisted the educated cadre of the Finnish colony in Sitka to scour the landscape far and wide in search of insects for him. The result was a massive New World collection, a treasure trove that supported about 15 years of Mannerheim's most significant research and remains a valuable resource today.

In this paper we focus on Mannerheim's "magnum opus", four monographic publications, which for a long time were the only comprehensive and authoritative expositions on the beetles of coastal Northwestern America. These contributions provide ample reason to recognize Count Mannerheim as a founder of coleopterology in western North America. Interestingly, Mannerheim never visited North America himself, and therefore his publications integrated what could be gleaned from the literature of the day, work by Eschscholtz and his own research on the new beetle materials collected mainly by many Finns in Russian America. Eschscholtz worked under the auspices of the Russian empire when he took part in two expeditions (1815-1818, 1823-1826) to the Pacific Ocean and to Russian America. During these grueling voyages he served double duty as the ship's physician and naturalist. As a naturalist extraordinaire, Eschscholtz collected and described a plethora of new species from a vast spectrum of plant and animal groups (Koponen and Niemelä 2020) and likely inspired the efforts of Mannerheim.

(Insert Figures 2,3)

Carl Gustaf Mannerheim: Administrator and Entomologist

Mannerheim had a distinguished career as a Finnish government administrator. Shortly after graduation from the University of Turku, at the age of 22, he was appointed in 1819 as the secretary to the Finnish

Secretary of State in Saint Petersburg. After several years of service there he moved on to become secretary for the Chancellor of the University of Turku in 1826. In 1833 and 1834, he was appointed as Governor of the Finnish Provinces of Vaasa and Vyborg (Viipuri), respectively. From 1839 until his death, he served as President of the Imperial Court of Appeals in Vyborg. Although Mannerheim made his living within the bureaucracy of government, deep within the soul of this civil servant, an insuppressible flame for beetles burned (Muona 2004).

Given the deep influence of Finnish naturalist C. R. Sahlberg during Mannerheim's education at the University of Turku, Mannerheim's father had worried that his son might be lost to the study of nature and beetles. At his father's determined urging, however, the Count pursued a distinguished career in public service, while remaining a passionate coleopterist. Mannerheim devoted much of his free time and money to amassing a collection of beetles and working out the appropriate taxonomy for those specimens. In addition to gathering together beetles from those working in the field, he also eagerly traded and purchased specimens to constantly enlarge his private collection (Muona 2004). The Count took his prized collections with him to his first job in St. Petersburg, and there he found the opportunity to increase them and his understanding of beetles substantially through new collegial connections, especially including many renowned entomologists residing in St. Petersburg (Muona 2004). Mannerheim's passion for understanding world beetle diversity never flagged during his 40 years of work. His resulting world-class scientific collection of Coleoptera consists of about 20 000 species and about 100,000 specimens (Silfverberg 1995; Muona 2004). As point of reference, all of Europe has an estimated 20,000 species of beetles (Albouy and Richard 2017).

Mannerheim's descendants likewise made notable contributions in both public service and science. For example, Mannerheim's daughter Anna Mannerheim (1840-1924) was the spouse of the famous Finnish-Swedish Arctic explorer and discoverer of the Northeast Passage, Baron Adolf Erik

Nordenskiöld (1832-1901). Furthermore, the Count's grandson, Baron Carl Gustaf Emil Mannerheim (1867–1951), was a revered 20th century Finnish military leader and statesman. His career began as an officer in the Imperial Russian Army, and during this period he accumulated extensive ethnographical collections during a demanding expedition through central Asia (1906-08) (Hálen 2008). The younger Mannerheim returned to Finland after the fall of the Romanovs and Finland's declaration of independence. Subsequently, as the legendary Marshal of Finland, he led the Finnish forces in resistance to Russia's WWII incursions, and eventually served as President of Finland (1944-1946). President Mannerheim has generally be regarded, alongside nationally revered composer Jean Sibelius, to be the most widely acclaimed Finn of all time (Klinge 2023).

President Mannerheim's grandfather, Count Mannerheim, and the focus of this paper, however, is generally recognized as the most accomplished Finnish entomologist of the 19th century. Muona (2004) divided his research into two periods. During the first (1823-1844), Mannerheim published 36 papers, making innovative systematic revisions of European Coleopteran families, especially the Staphylinidae. In fact, Muona (2004) regards Mannerheim's classification of rove beetles as his most important systematic work of the first period. From 1840's onwards, Mannerheim threw himself into descriptive studies of the beetle fauna of Pacific Northwest America, published as the four monographs mentioned above. In his work, Mannerheim followed mainly the progressive systematic approach adopted by the legendary French coleopterist, Pierre F.M.A. Dejean (1780-1845) Dejean (1837). In addition, the count also adopted new methods based on something similar to the synapomorphy concept of modern phylogenetic systematics (Muona 2004). Clearly, Mannerheim was a progressive thinker in the field of systematics that was burgeoning in his times.

Early work on the Beetle Fauna of Russian America

Little research had been done about Russian American beetles before 1840, and thus, this fauna was poorly known when Mannerheim's efforts began. Mannerheim (1843) regarded the late Professor Eschscholtz, with whom he had interacted in St. Petersburg, as the foremost authority on Russian American insects, praising his two publications (*Entomographien* 1822 and *Zoologischer Atlas* 1829-33) as important basal contributions for understanding this fauna. Scattered information, largely based on Eschscholtz's collection, was included in *Entomographie de la Russie* (1837) by Johann G. Fischer von Waldheim (1820-1851) and in *Catalogue des Coleopteres* by Dejean (1780-1845). In addition, Mannerheim (1840) had described two new species from Fort Ross, California.

After 1840 and until his death, Mannerheim's work dominated the literature about the Russian American coleopteran fauna. In summarizing Mannerheim's four major papers on this topic, we seek to reveal the step-wise and highly collaborative enterprise that Mannerheim led, to recognize contributions of the significant players, and finally to underscore Mannerheim's central importance in understanding this fauna. The content of each of these monographs is summarized in the sidebar.

(Insert Sidebar)

Mannerheim and Coleopterology in Western North America

Mannerheim was doubtlessly a busy man, with duties as summarized on the title page of the fourth monograph of his "magnum opus", formally introducing him as follows:

"Count C.G. Mannerheim, Doctor of Philosophy and of both Laws, President of Imperial Court of Appeal at Wiburg, Grand Cross of the Order of St. Wladimir II Class, Grand Cross of the Order of St. Anne I Class with Imperial Crone, Grand Cross of the Order of St. Stanislaus I Class, Member of several Science Academies and Societies of Scholars" (Mannerheim 1853).

It is hard to imagine that such an accomplished public servant, government administrator and judge, with a career so clearly occupied by responsibilities for non-entomological matters, found time and enthusiasm for scientifically significant studies of Coleoptera. Nonetheless, although his heavy administrative duties likely precluded personal participation in the field work after his youth, Mannerheim both built an enormous world-wide beetle collection and produced four comprehensive monographs that organized the study of beetles from Russian Alaska. Much of the latter effort was made during the last 15 years of his life. How did he manage this commitment?

Mannerheim's efforts must have involved effective time management in addition to a high level of entomological skill. In his biographical sketch of Mannerheim, for example, Muona (2004) reported that the Count was conspicuously absent for much of his life from social functions commonly attended by individuals of his social standing. Instead, we must suppose, he was working on beetles. Muona (2004) further suggested that Mannerheim was driven by a special affinity for the study of beetles that went far deeper than mere material fascination. Keller (1983) called this a "feeling for the organism", an intuitive understanding of the biological essence of a group of organisms, surpassing objective knowledge, and perhaps a focused connection subsumed in Wilson's (1984) Biophilia Hypothesis. Such devotion may well have consequences for investigators and the outcomes of their work. As suggested by the renowned American scientist George Washington Carver (1864-1943) in a famous aphorism, "if you love it enough, anything will talk to you" (Clark 1976). Count Mannerheim devoted himself to revealing such secrets about Russian American beetles.

In addition to an "inordinate fondness for beetles", it seems that Mannerheim had a special flare for developing personal connections and using them to achieve his objectives. His work on the Russian American fauna depended on both such connections and on understanding and

interpreting the taxonomic work of others. Most of the work on the Russian American fauna was based on the tens of thousands of specimens collected by Finnish collaborators who Mannerheim encouraged in Alaska. These included an impressive bunch of intellectually inclined people such as Uno Cygnaeus (1810-1888) who was also founder of the Finnish public school system, the medical doctors, Alexander Fredrik Frankenhaeuser (1812-1884) and Achilles Pippingsköld (1809-1866), the mineral engineer, Henrik Johan Holmberg (1818-1864), and Mannerheim's friend and entomologist, R. F. Sahlberg. In addition, the Finnish explorer and Governor, Arvid Adolf Etholén deserves special mention for his unstinting support of these collections.

In his third monograph Mannerheim (1852) presented a revised checklist of 332 beetle species from Russian America, that he had mostly described along with four other scientists (see Sidebar). In short, these five scientists of varied national origins, all serving the Russian Empire, had described nearly 80 % of the beetle species known to occur in Russian America in 1852. Work of these same scientists also provided the core of Mannerheim's (1853) fourth monograph that increased the number of known species to 540. Mannerheim drew all of this work together and provided the critical focus to produce these excellent synthetic monographs. Fredrik Wilhelm Mäklin (Figure 4), later a Professor of Zoology at the University of Helsinki, had described 87 species included on the final list, while Motschulsky and Ménétriés had together described 70 species. The remainder (64), about 12% of the total Russian America fauna known at the time, were mainly Holarctic species described earlier by various European naturalists

Insert Figure 4

Based on their foundational work, Eschscholtz and Mannerheim must be recognized as cofounders of the entomology of Russian America. As laid out by Koponen and Niemelä (2020)**,** Eschscholtz described numerous

species (105) and genera (25), numbers that compare favorably with Mannerheim's 214 species and 20 new genera. Mannerheim focused on Alaskan beetles but, collectively Eschscholtz and Mannerheim also contributed enormously to the early coleopterology of California. In fact, according to Fall (1901), the early knowledge of the beetle fauna along the American Pacific coast was found entirely in publications of Eschscholtz (1829) and Mannerheim (1843-53). Fall's (1901) *List of Coleoptera of Southern California* Fall included 55 taxa named by Mannerheim and another 13 named by Eschscholtz. These remained central "go-to" publications for this region, standing alongside the prodigious contributions of John Lawrence LeConte (1825-83), who is recognized as the father of American coleopterology (Evans and Hogue 2004). LeConte himself acknowledged that Mannerheim's studies of Alaskan Coleoptera were better developed than those from any other part of the American continent (see Fall 1901).

Mannerheim's personal Nordic/European beetle collections were greatly enlarged by new materials derived from Russian America but also included material from many other locations. Much of this latter material was derived from the stream of Finnish travelers to Sitka from Finland and St. Petersburg, who sailed a long route around Cape Horn and made rich collections in Brazil, Chile, California, Hawaii and other places. On the return home, some also collected in Siberia for Mannerheim (Saalas 1958). In his fourth monograph, Mannerheim (1853) described these routes and many of the localities that yielded beetles underscoring his interest in the broader natural history of these species.

Mannerheim: A Two-Century Retrospective

Mannerheim published a number of standard systematic revisions during his 30-year career in addition to his four-volume magnum opus. These works, like his first study on a false click beetle genus *Euchnemis* (Figure

5a) and its relatives (Mannerheim 1823), and his classification of certain staphylinids (Mannerheim 1830), are contributions to insect taxonomy that have retained their value (Muona 2004). Overall, however, we suggest that the great achievement and capstone of Mannerheim's entomological work was his magnum opus. These four volumes organized and presented the faunistic and taxonomic details about the known beetle fauna (540 spp.) of Russian America in the mid-19th century. Mannerheim had recognized and described 214 of these species himself. Simply put, this work laid the foundation for subsequent research on Coleoptera in western North America.

To put the importance of this work in proper perspective, we note that Bosquet et al. (2013) reported 1448 species of described beetles in Alaska. Although his list included species from northern California, Mannerheim's organized list of 540 species, more than a third of what is known today, obviously contributed substantially to understanding this fauna.

Furthermore, it is clear that Mannerheim approached his work carefully and with serious attention to detail. For example, many species names by Mannerheim (170) and Mäklin (70) are still valid today. In contrast, only 30 Eschscholtz names remain valid and the combined number of still valid names for species in this fauna attributed to three other early researchers of Russian American beetles (Motschulsky, Fischer von Waldheim, and Ménétriés) is about 35 (Bousquet et al. 2013). Interestingly, Mannerheim was notably careful about using Motschusky names as he did not trust the work (Mannerheim, 1846).

In their classic overview of western forest insects Furniss and Carolin (1977) report that of 30 species described by Mannerheim, 28 are still valid and the other two are recognized as junior synonyms (Figures 5b,c). Six of Mannerheim's species are common xylophages, having vernacular names: Rugose stag beetle, *Sinodendron rugosum* (Lucanidae), Spruce limb borer, *Opsimus quadrilineatus (*Cerambycidae), Oak cordwood borer,

Xylotrechus nauticus (Cerambycidae), Spruce beetle, *Dendroctonus obesus* (= *D. rufipennis*, Scolytinae), Silver fir beetle, *Pseudohylesinus sericeus* (Scolytinae) and Sikta spruce ips, *Ips concinnus* (Scolytinae). Clearly, Mannerheim's work has held up well in light of modern research.

The splendid and still very useful world-class collection, Coleoptera Mannerheim, resides in the Finnish Museum of Natural History, University of Helsinki (LUOMUS). This treasure is a well-curated, world-wide collection containing *ca.* 20,000 species and 100,000 specimens. It includes 800 type specimens described by Mannerheim. In fact, it holds Mannerheim types for 96 North American species and Mäklin types for 47 North American species distributed among the families Agyrtidae, Carabidae, Cholevidae, Dytiscidae, Empelidae, Hydraenidae, Hydrophilidae, Leiodidae, Ptiliidae, Silphidae, Sphaeritidae, and Staphylinidae (Biström 1987, Silfverberg 1987, 1988a, b).

As a paradoxical aside, we note that Mannerheim's vast collection, which was begun and enlarged under 19th century Russian governance, was threatened with destruction 100 years later by Stalinist Russian aggressors as their bombs rained down on Helsinki during WWII. At that point, the collection was wisely moved to the countryside, in hopes keeping it safe, given its exceptional value even today as a taxonomic resource with world-wide significance. In additional to his seminal work on the fauna of Russian Alaska, Mannerheim described species from many other places (e.g., Figure 5d).

Insert Figure 5

Following the eponymous traditions growing in the wake of Linnaean binomial nomenclature (Heard 2020), Mannerheim named many new species in honour of their collectors. These include *Brachinus tschernikhii* and *Bembidium kuprianovii* (Carabidae), *Philonthus siegwaldii* (Staphylinidae), *Cibdelis blaschkii* (Tenebrionidae) and *Pytho sahlbergi*

(Pythidae). He also described in 1840 the tenebrionid species *Eleodes fischeri* and C*oniontis eschscholtzii* in genera described by Eschscholtz. Mannerheim names are familiar to all coleopterists working on the fauna of western North America.

Naturally, many species have been named by others to honor Mannerheim. These include, for example, the beetles *Rhynchites mannerheimii* Hummel, 1823 (Attelabidae), *Bembidium mannerheimii* Sahlbeg, 1827 (Carabidae), *Haltica mannerheimii* Gyllenhal, 1827 (Chrysomelidae), *Oxyporus mannerheimii* Gyllenhal, 1827 (Staphylinidae), (Carabidae), *Nebria mannerheimii* Fischer von Waldheim, 1828 (Carabidae), *Anchomenus mannerheimii* Dejean, 1828 (Carabidae), *Agaocephala mannerheimii* Castelnau, 1832 (Scarabaeidae) and *Dermestes mannerheimii* LeConte, 1854 (Dermestidae), and even the fly, *Dolichopus mannerheimi* Zetterstedt, 1838.

Insert Figure 6

During studies under the International Biological Programme (UNESCO) in Finnish Lapland, two of the authors (SK and PN) repeatedly encountered the beautiful staphylinid beetle, *Mannerheimia arctica* (Erichson, 1840) (Figure 6), flourishing in the litter of mountain birch forest floors (Haukioja and Koponen 1975). In moments of reflection the beetles brought premonitions of the presence of Count Mannerheim himself. Perhaps this genus, established and named in 1880 by Mannerheim's Finnish colleague, F.W. Mäklin, is the Count's living avatar! Without question, Count Carl Gustaf Mannerheim has left a lasting legacy in entomology, especially important among those interested in the Coleoptera of the American Pacific Northwest. Carl Jung (1875-1961) said that "the purpose of human existence is to kindle a light in the darkness of mere being" (Jung and Jaffé 1963). From that perspective, Mannerheims's

life long devotion to beetles was a lasting gift of entomological light that dispelled the early darkness about the Russian American fauna.

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Sidebar

The four monographs comprising Mannerheim's magnum opus

Monograph 1. *Beitrag zur Käfer-Fauna der Aleutischen Inseln, der Insel Sitkha und Neu-Kaliforniens*.(Mannerheim 1843).

Geographical coverage: Mainly the area surrounding Fort Ross, California or Sitka Island in southern Alaska.

Number of species: Information about 300 spp. in total, including 147 that were previously undescribed (101) or unknown in the area. Overall, 87% of the names in this paper are attributed to either Eschscholtz or Mannerheim.

Monograph 2. *Nachtrag zur Käfer-Fauna der Aleutischen Inseln und der Insel Sitkha.* (Mannerheim, 1846).

Geographical coverage: Area around Sitka, Unalaska (Aluetian Islands).

Number of species: 15 spp. named by Mannerheim (12) or Eschscholtz (3) were described or redescribed.

Monograph 3. *Zweiter Nachtrag zur Käfer-Fauna der Nord-Amerikanischen Länder der Russischen Reiches*. (Mannerheim 1852).

Geographical coverage: Continental Alaska and adjacent continental areas, including a species list for all of Russian-America.

Number of species: Coverage of 332 spp. from Russian-America; 180 of these from Alaska, including new spp. described by Mannerheim (57), Mäklin (48), Motschulsky (21) or Eschscholtz (17).

Monograph 4. *Dritter Nachtrag zur Käfer-Fauna der Nord-Amerikanischen Länder der Russischen Reiches* (Mannerheim 1853).

Geographical coverage: Mainly the Kenai Peninsula and Kodiak Island, but gave the total count of species (540) known from Russian-America.

Number of species: Treated 265 spp., including new spp. described by Mannerheim (100), Mäklin (39), Eschscholtz (18), Motschulsky (16) or Ménétriés (6).

Figure Legends

Figure 1. German-Russian artist Louis Choris (1795--1828) took part in the first J. F. Eschscholtz expedition to Russian-America. He painted sceneries of the journey and documented lifestyles of indigenous peoples. In this painting, the research vessel, *Rurik*, is anchored in the Bering Sea near Saint Paul Island (Alaska), a hunting area for fur seals. (Wikimedia Commons)

Figure 2. Carl Gustaf Mannerheim (1797–1854), painting by Johan Erik Lindh, 1849-51. (Wikimedia Commons)

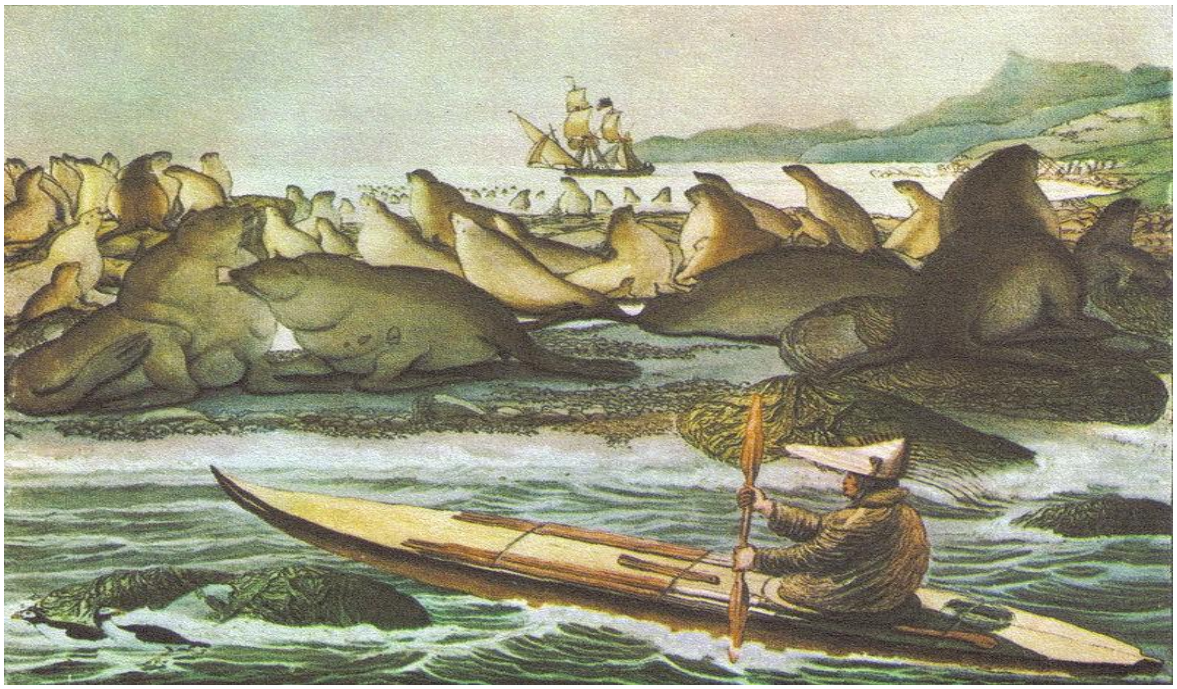
Figure 3. Johann Friedrich von Eschscholtz (1793–1831)**.** (Wikimedia Commons)

Figure 4. Fredrik Wilhelm Mäklin (1821-1883), co-worker of Mannerheim; later Professor of Zoology, University of Helsinki. (Wikimedia Commons)

Figure 5. Specimens of species associated with Mannerheim in the Finnish Museum of Natural History (LUOMUS), Helsinki. a) *Rhacopus sahlbergi* (Mannerheim, 1823), homotypic synonym for *Eucnemis sahlbergi* from the personal collection of J. Muona; b) The lectotype specimen of *Buprestis langii* Mannerheim, 1843 from Sitka, Alaska; c) The holotype specimen of *Clerus eximius* Mannerheim, 1843 from California; d) The lectotype of *Hyperantha menetriesii* Mannerheim, 1837 from Brazil; e) *Platynus mannerheimii* (Dejean, 1828), homotypic synonym for *Anchomenus mannerheimii*. (Photos: Pekka Malinen, Coleoptera Mannerheim, LUOMUS).

Figure 6. *Mannerheimia arctica* (Erichson 1840), a species from Northern Europe, Alps, Siberia. Living in leaf litter, very local, rare. Photo by Udo Schmidt, 2015 (https://www.flickr.com/photos/coleoptera-us/19514802843/in/photostream/)

Figures with legends, Kopenen et al., Mannerheim



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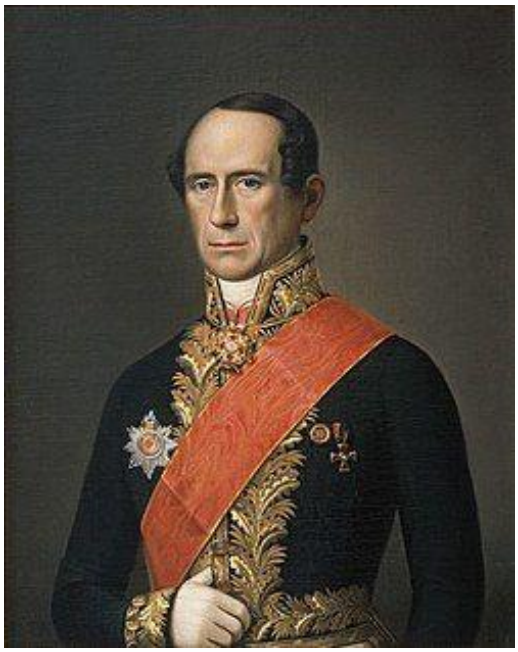

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Figure 3. Johann Friedrich von Eschscholtz (1793–1831)**.** (Photo by Unknown author - Zoologischer Atlas, enthaltend Abbildungen und Beschreibungen neuer Thierarten, waehrend des Flottcapitains von Kotzebue zweiter Reise um die Welt, auf der Russisch - Kaiserlichen Kriegsschlupp Predpriaetie in den Jahren 1823-1826. - Berlin, 1829., Public Domain, https://commons.wikimedia.org/w/index.php?curid =22956056)

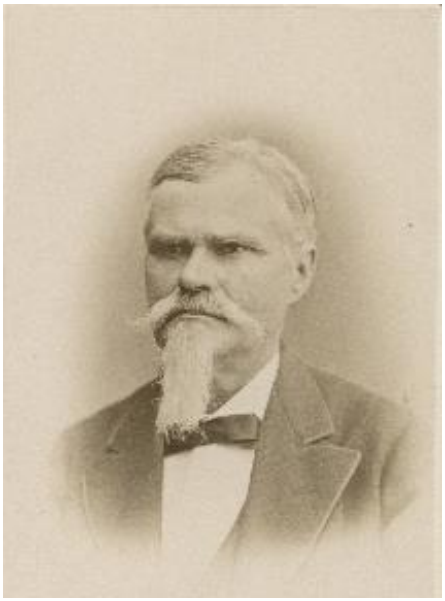

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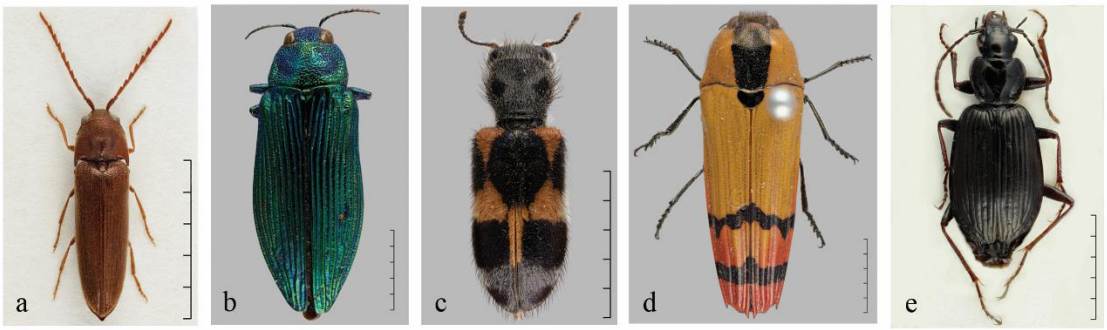
Figure 5, with legend and suggested layout.



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