# Potosia speciosissima Scop. subfossil in Denmark (*Coleoptera Lamellicornia*).

By Palle Johnsen and Harald Krog.

Last February Mr. Carl Sørensen, Tinglev, made an inquiry to the Zoological Museum of Copenhagen. He submitted some chitinous parts of a beetle, found in peat in July 1947. The finding-place is Emborg at the northern side of the Mossø Lake in the middle of Jutland.

The find consists of a well preserved prothorax and scutellum, two connected and well preserved elytra and a few badly preserved parts of ventral sclerites. The size and shape of the elytra with a rather deep sinuation at the side just behind the shoulders, and the shape of the prothorax and the great scutellum very soon made it clear that the beetle was to be classed among the group *Cetoniini* of the subfamily *Melolonthinae*. From this group only three species are known in Denmark, viz. *Cetonia aurata* L., *Liocola lugubris* Hbst. (*marmorata* F., *aeruginea* Hbst.), and *Potosia cuprea* F. The length of the elytra of the find is 18 mm; length of elytra of the greatest species of *C. aurata* and *P. cuprea* in the museum's collection is considerably smaller — 9.6 and 15 mm respectively. The attention was turned upon our third and greatest species: *L. lugubris*. Its elytra — also measured from the biggest Danish specimen — have a length of 17 mm, but the microsculpture of the elytra from the find did not agree with this species, nor with the two other Danish species. The attention was then turned upon

the Central-European species of the group, and when comparing the species of the foreign collection in the museum it was ascertained that the subfossil species was *Potosia speciosissima* Scop., in which the elytra are about 18 mm, and the microsculpture being in complete accordance with that of the find from peat. The species *Cetonia affinis* Andersch. could be left out of question,

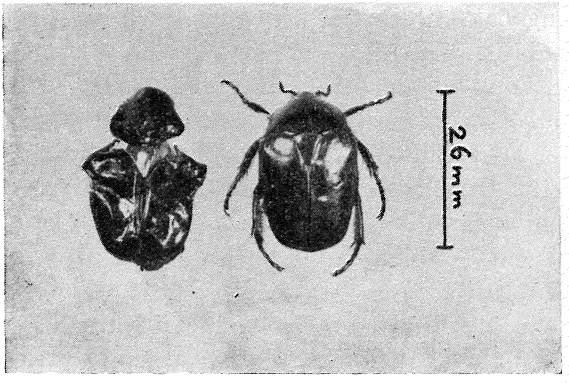


Fig. 1. *Potosia speciosissima.* To the right the subfossil find. To the left recent specimen from Germany. U. Møhl-Hansen phot.

partly because the length of the elytra in the greatest specimens did not exceed 15.1 mm, and partly because its microsculpture was diverging.

Curiously enough the chitin was quite dark (and shining). Henriksen namely states (1933), regarding a subfossil material consisting of about 200 species of beetles, that the colour of the elytra found is very well preserved — not only black colours, but also the metal-greenish structural colour which characterizes the species of *Cetonia*. Also *Potosia speciosissima* bears this metal-green colour. Not until the elytra began to curl owing to drying up and were put in alcohol the black colour slowly faded away and was replaced by a metal-blue one, which gradually changed into the original metal-

greenish colour, a fact that further confirms the identification. *Potosia* (formerly *Cetonia,* subgenus*: Cetonischema*) *speciosissima* Scop. (syn. *aeruginosa* Drury) has hitherto not been found fossil (Fig. 1).

The species is the greatest Central-European Rose Chafer, and moreover the most beautiful, being even more shining than the other species. It is a typical oak-animal. The larva lives in trunks and branches of old decaying oaks, the wood of which having already started moulding. The imago swarms around these old oaks, partly owing to the egg-laying, and partly in order to get food. The imago is — according to its feeding biology — to be classed among the juice-lickers, sucking the juice perspiring from the oaks. Generally the larvae are not to be found in stubs, but high up in the trunks or branches of oaks, which have begun dying from the top (Brehm 1915).

In the big Coleoptera-books the following is said of the geographical range of *Potosia speciosissima*: common in South Europe to Caucasus. In Central Europe it is recorded to be a rare animal in most places. As the species does not occur in Denmark in our days, it may be interesting to examine its recent range more closely. Borchert (1938) has tried to compile information as to the range of the species, but as he records it from the Åland Islands and South Finland, where it is certainly not to be found according to Hellén (1939), and omits to give any references, we dare not lightly use his records, but by means of the original literature we have made the map shown as fig. 2 giving the proximate range of the species in Europe. Naturally the distribution is not so continuous as the scratching says, as you will find the species only in oak-tree grown lowland. The map has been made by means of an examination of a series of catalogues and numerous local faunistic records. In the case of USSR it has not been possible to ascertain any-

thing definite, partly because the region has never been too thoroughly examined in this respect, and partly owing to the lack of the necessary literature in Denmark. The range then is as follows (Fig. 2):

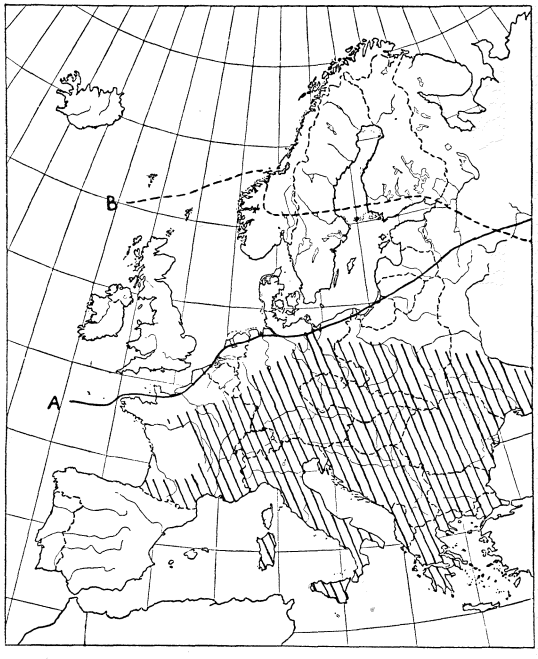


Fig. 2. Scratched: Approximate range of *Potosia speciosissima*. A: 18° C July-isotherm.
B: Northern limit of *Quercus*.

**France:** Fontainebleu, Loiret, Meurthe-et-Moselle, Sarthe, Loir-et-Cher, Indres-et-Loire, Landes, Illier, the Lyon-district (Bedel 1911), Alsace-Lorraine, Gascogne, South-East France (Paulian 1941), Alpes-Maritimes, Ille-et-Vilaine (Borchert 1938). **Italy:** All over the country (Bertolini 1904). **Yugoslavia:** Sibenik and Ragusa in Dalmatia (Zool. Mus. Cph.). **Greece:** Attika, Parnassos, Morea (v. Oertzen 1886). **Switzerland:** Payerne at Como, Schaffhausen, Basel, Vaux (Stierlin and Gau-

tard 1867), Genève (Bedel 1911). **Austria:** Steiermark near St. Leonhard and Cille (Brancsik 1871). **Hungary** (Zool. Mus. Cph.). **Romania:** Comana (Stefanescu 1885), Hermannstadt, Hamersdorf, Girelsau, Zood-Thal, Fogares, Kronstadt, Tartlau, Mediasch, Schässburg, Sächsich-Regen (Bielz 1887), Racovitza (Bedel 1911). **Bulgaria** (Borchert 1938). **Czechoslovakia:** Böhmen (Schenkling 1921—37), Mähren (Reitter 1898), Bratislava (Rozay 1880). **Turkey** (Reitter 1898). **USSR:** Caucasus (Schenkling 1921—37), Podolien (Ssawtschenko 1933), Kiev (Hochhut 1873). **Poland** (Borchert 1938). **Germany:** Prussian Rhine-District (Bach 1849), Nassau, Frankfurt, Oberschlesien (Schenkling l. c.), Berlin (Bedel 1911), Magdeburg, Koblenz, Erfurt (Borchert 1938), Bayern (Gemminger and de Harold 1868), Erlangen (Zool. Mus. Cph.), Mirow in Mecklenburg (Clasen 1863).

In England, Norway, Sweden, Finland, Denmark and the Netherlands, from where we have up-to-date records, the species does not occur. In Lithuania, Latvia, and Estonia it is not found according to Seidlitz (1887—91), whereas Borchert records it here without stating any references, so there is a probability that he is wrong here as in his record from Finland. Seidlitz (l. c.) states the species to be non-existing in East Prussia. Borchert's northern limit of the species in Germany lies according to his map in Holstein, also without statement of references. In spite hereof looking for the species in numerous local records (from Lübeck, Bremen, Hamburg, Westfalen, Oldenburg, Niederelbgebiet, Schleswig-Holstein and Elberfelt) has been in vain.

Comparing the approximate northern limit of the species, which is near the 18° C July-isotherm (entered on the map acc. to Diercke 1935), and our knowledge of the biology of the species, which is said to be a typical oak-animal, it is possible to draw conclusions as to the time this species immigrated into Denmark

and the time of extinction thereof. Everything indicates that *Potosia speciosissima* has immigrated into Denmark during that time of the postglacial heath period in which the oak mixed forest has been dominant. This is the epoch in which conditions in Denmark were most favourable to the species. Ample food for the imago and larva was to be found in the huge oak woods, and the temperature is supposed to have averaged 18° C in July against 16° C now-a-days (Johansen & Lynge 1917, Iversen 1944), so it is quite reasonable to believe that the species has hummed in the Danish oak woods until the subatlantic period with its cold and moist climate caused its extinction here.

The possibility that *Potosia speciosissima* had become extinct on account of less frequent occurrence of the oak in Denmark during the subatlantic period can, however, be left out of consideration on comparing our knowledge of the history of the oak in Denmark in the subatlantic period with our knowledge of some beetles which like *Potosia speciosissima* are dependent on old oaks. During the subboreal period the oak was more dominant than ever in Denmark, but even in the following subatlantic period or beech time the oak in spite of the progress of the beech has been a common tree in most parts of the country, and particularly the old, often isolated oaks have had good conditions until the more rational scheme of cultivation of the woods was introduced in 1805 (Vaupell 1863). Right into the middle of the last century old oaks were rather frequent, but since then they have thinned out steadily so now-a-days an old oak is a rarity. If we look at some of the rarities of our scarab-fauna, e. g. *Gnorimus octopunctatus* F., *Osmoderma eremita* Scop. and *Liocola lugubris*, we see that they are all connected with old oak trees, in which the larvae live. All these three species must now be considered extinct or dying out in Denmark. The latter

species has — as far as we know — not been found in this country during the last 40 years. *O. eremita* has disappeared from most of the old findingplaces, and recently it has only been found in Bognæs Storskov, Vemmetofte Dyrehave, and Korselitse. The last find of *G. octopunctatus* was made in 1915 (West 1940-41 and 1947). These species have probably also immigrated into Denmark during the first part of the oak mixed forest period and have succeeded in surviving the immigration of the beech. Their extinction in this century is supposed to be a consequence of the discussed increasing lack of old hollow oak-trees, which are especially sought by the species, and not as a consequence of climatic changes. On the contrary these changes should recently have become more favourable for these southern species. Furthermore the species in question do exist in South Norway, and in Sweden they are recorded nearly up to the northern limit of the oak-tree (entered into the map fig. 2 acc. to Diercke l. c.). *O. eremita* and *L. lugubris* are known from South Finland (Hellén 1939). It is probably not the expelling of the oak by the beech during the subatlantic period that caused the extinction of *P. speciosissima* in Denmark, but rather the colder climatic conditions, for in case the species had been able to manage here in spite of the decreasing temperature, it would certainly — like *G. octopunctatus, O. eremita,* and *L. lugubris* — have stuck to the remnants of oak forest right into the time in which entomologists started their investigation of the Danish fauna.

According to the statements which accompanied the find the beetle was found in peat, dug out from a depth of 2.5 metres, and the beetle was accompanied by a piece of the peat in which it was found. Moreover in prothorax and elytra there was so much peat-mass that a sample could be taken. Both samples have been subjected to a pollen-analysis. Owing to the drying up of

the samples they had to be crushed in a mortar before the real preparation could take place. As a heavy drying up may have the consequence that among others the pollen of *Fagus* will be beyond identification, a control analysis was made with the sample submitted, after soaking in a 5 per cent potassium hydroxide for a fortnight. By this procedure the risk of destroying the pollen is considerably reduced.

The result of the analyses appears from the following tables (fig. 3—4) where all figures indicate percentages of the sum of tree-pollen.

| | | Salix | Betula | Pinus | Alnus | Ulmus | Tilia | Fraxinus | Quercus | QM (Ulmus + Tilia + Fraxinus + Quercus) | Sum of tree-pollen | Corylus | Populus | Frangula alnus | Hedera |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample from beetle | | 0,7 | 44 | 2,2 | 34 | 0,3 | 2,8 | 0,3 | 16 | 19 | 292 | 12 | | 0,3 | |
| Sample submitted | unsoaked | 0,5 | 43 | 1,3 | 31 | 2,0 | 5,6 | 0,5 | 16 | 24 | 198 | 17 | | | |
| | soaked | 0,6 | 52 | 1,9 | 26 | 0,8 | 1,7 | 0,6 | 16 | 19 | 477 | 6 | 0,2 | 0,2 | 0,2 |

| | | Gramineae | Cyperaceae | Plantago lanceolata | Artemisia | Chenopodiaceae | Rumex | Humulus | Umbelliferae | Calluna | Dryopteris | Pteridium | Sphagnum | Undeterminable on account of destruction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample from beetle | | 0,3 | 10 | 0,7 | | | | | 1,0 | 1,0 | 0,7 | 0,3 | | 24 |
| Sample submitted | unsoaked | 4 | 6 | 0,5 | | 0,5 | | | | 1,5 | 1,0 | 0,5 | 0,5 | 16 |
| | soaked | 1,3 | 11 | | 0,2 | | 0,6 | 0,2 | | 1,9 | 0,8 | 0,8 | | 15 |

Fig. 3—4.

Regarding the samples it must be noticed that both of them consisted of forest fen peat, and contained ample, but often highly destructed pollen, that the *Betula*-pollen appeared in lumps in all the analyses and the *Alnus*-pollen in one, which indicates a local surplus of both.

By means of the two different ways of treating the sample submitted we have not after soaking succeeded in finding any important pollen-types (as e. g. *Fagus*) which were not found in the unsoaked sample and which might change the interpretation of the analysis; on the contrary they are in complete accordance. Furthermore an equally fine agreement exists between the sample from the animal and the other one, so that a contingent impurity consisting of later added material can be left out of question. The small discrepancies, which do exist, must partly be ascribed to the always existing statistic uncertainty, partly to the uncertainty which is induced by the high degree of destruction and the local surplus of *Betula* and *Alnus*.

The three analyses clearly refer to pollen-zone VIII, the subboreal period (Jessen 1935, Iversen 1941) from the following reasons: the total lack of *Fagus* and *Carpinus*, the slight frequency of *Pinus*, in spite of the strong destruction which, owing to the great power of resistance of the *Pinus*-pollen, causes a surplus of *Pinus*; and moreover the insignificant amount of *Calluna*-pollen excludes the fact that the peat is younger. The fact that the *Ulmus* is so infrequent makes it impossible that the peat may have been formed in an older period. The appearance of *Plantago lanceolata* in two of the analyses is another proof of this fact, as this plant is an absolute indicator of agriculture (Iversen 1944), which did not come to Denmark until the beginning of the subboreal period.

Curiously enough it appears that the latest subfossil find of an insect, the beetle *Cerambyx cerdo* L. (*heros* Scop.) in Denmark (Thomsen & Krog 1948) is a complete parallel to the one mentioned here. *Cerambyx cerdo, Laccophilus variegatus* St. (Henriksen 1933, p. 324), as well as *Potosia speciosissima* represent an element of the Danish fauna, which has immigrated during the postglacial heath period, and later on withdrawn during the

subatlantic period, when the climate grew worse. It seems quite natural for us to consider this aggravation of climate the cause of the extinction of these species in Denmark. The find of *Potosia speciosissima* is especially interesting as only very few species are known, belonging to this element of our fauna.

**Resumé.**

I Tørv fra Emborg ved Mossø i Midtjylland er Torbisten *Potosia speciosissima* (Fig. 1) fundet. Arten er ikke kendt fra Danmark eller Fennoskandien. Artens nuværende Nordgrænse i Nordtyskland, dens Udbredelse (Fig. 2) og Kendskabet til dens Biologi, der siger, at Arten er et typisk Egedyr, særlig knyttet til gamle Ege, giver Grund til at formode, at Arten maa have levet i Danmark i Egeblandingsskovens Tid, da der var rigelig Næring og varmere Klima. Pollenanalyse (Fig. 3—4) af Fundet viser, at dette er rigtigt, idet Fundet kan henføres til Pollenzone VIII, den subboreale Tid. Det antages, at Arten er uddød som Følge af den subatlantiske Periodes Klimaforværring og ikke som Følge af Bøgens Fortrængning af Egen, idet andre Ege-Torbister, som maa antages at være indvandret i Egeblandingsskovens Tid, og som har kunnet taale Klimaforværringen, har kunnet holde sig her i Landet helt op i vor Tid. Fundet frembyder særlig Interesse ved at være et Eksempel paa et Element i den danske Fauna, der er indvandret i Egeblandingsskovens Tid og uddød med Klimaforværringen i subatlantisk Tid. Kun yderst faa Repræsentanter for dette Element af vor Fauna er kendt.

## Literature.

Bach, M. 1849—60. Käferfauna für Nord- und Mittel-Deutschland. Coblenz.

Bedel, L. 1911. Faune des coléoptères du bassin de la Seine II. Ann. Soc. Ent. France.

Bertolini, S. 1904. Catalogo dei Coleotteri d'Italia. Siena.

Bielz, E. 1887. Siebenbürgens Käferfauna. Hermannstadt.

Borchert, W. 1938. Die Verbreitung der Käfer Deutschlands. Schönebeck.

Brancik, C. 1871. Die Käfer der Steiermark. Graz.

Brehm, A. 1915. Tierleben II. Leipzig & Wien.

Clasen, F. 1853. Uebersicht der Käfer Mecklenburgs I. Arch. Ver. Natur. Mecklenburg 7.

Diercke, 1935. Skolatlas. Stockholm.
Gemminger & de Harold. 1868. Catalogus Coleopterorum 3. Paris/London.
Hellén, W. 1939. Catalogus Coleopterorum Daniae et Fennoscandiae. Helsingforsiae.
Henriksen, K. 1933. Undersøgelser over Danmark-Skånes kvartære Insektfauna. Vid. Med. dansk Nat. For. 96. Festskr. II.
Hochhut, J. 1873. Enumeration der in den russischen Gouwernementen Kiew und Wolhynien bisher aufgefundenen Käfer. Bull. de la Soc. Nat. de Moscou. XLVI. Nr. 1.
Iversen, J. 1941. Landnam i Danmarks Stenalder. A pollenanalytical study of the influence of farmer culture on the vegetational development. Danm. Geol. Unders. II. Rk. Nr. 66. København.
— 1944. Viscum, Hedera and Ilex as climate indicators. Geol. Fören. Stockh. Förhandl. 66. H. 3. Stockholm.
Jessen, K. 1935. Archaeological dating in the history of North Jutlands vegetation. Acta Archaeologica. V Fasc. 3. København.
Johansen, A. C. & Lynge, H. 1917: Om Land- og Ferskvandsmolluskerne i holocæne Lag ved Strandgaarden SSO. for Kalundborg, og deres Vidnesbyrd om Klimaforandringer. Medd. Dansk geol. For. Bd. 5.
v. Oertzen, E. 1886. Verzeichniss der Coleopteren Griechenlands. Berl. Ent. Zeit. 30.
Paulian, R. 1941. Coléoptères Scarabéides. Faune de France 38. Paris.
Redtenbacher, L. 1874. Fauna Austriaca. Wien.
Reitter, E. 1898. Bestimmungstab. d. europ. Coleoptera. Hft. 38. Wien.
Rozsay. 1880. Enumeratio Coleopterorum Posoniensum. Verh. Ver. f. Natur- & Heilkunde. Presburg 1873/75.
Schenkling, S. 1921—37. Coleopterorum Catalogus 21. Berlin.
Seidlitz, G. 1891. Fauna Baltica. 2. Ausg. Königsberg.
Ssawtschenko, E. N. 1933. Uebersicht der Podolischen Blatthornkäfer. Travaux du Mus. Zool. 12. Kiev.
Stefanescu, 1885. Entomologia Romana.
Stierlin, G. & Gautard, V. 1867. Die Käferfauna der Schweiz.
Thomsen, M. & Krog, H. 1948. *Cerambyx cerdo* L. (*heros* Scop.) fra subboreal Tid i Danmark. Vid. Med. dansk Nat. For. 111. In print.
Vaupell, Chr. 1863. De danske Skove. København.
West, A. 1940-41. Fortegnelse over Danmarks Biller. Ent. Med. 21.
— 1947. Tillæg I til Fortegnelse over Danmarks Biller. Ent. Med. 25.