

THE GREAT EUROPEAN STAG BEETLE — ITS PAST AND ITS FUTURE

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The largest of the European beetles is *Lucanus cervus*, variously known as Xuk-aliei (?) (= Deer-beetle in Russian), Stag (English), Cerf-volant (French), Hirschkafer (German), Szarvasbogár (Hungarian). This beetle is well known in Europe among the other insects not only by entomologists and zoologists, but also by the population in general. This large beetle belongs to the extensive family of Lucanidae, commonly called Stag Beetles, that contains about 800 species, although these are mainly from tropical areas. Only a few of the smaller species are known in Europe and of these *cervus* is the largest being up to 74mm in body size. It is distributed throughout the palaearctic region being particularly common from Middle Europe to the Baltic Sea basin in the North and being found especially in oak tree forests. In the USSR for example there are known some 15 species of Lucanidae, including the genera *Dorcus* (3 species), *Platycerus* (2 species), *Ceruchus* (1 species), *Sinodendron* and *Lucanus*. Apart from the last, all the species in these other genera are small beetles about 12-32mm in body size and occur especially from the Southern European part of USSR, the Crimea and the Caucasus. *L. cervus* inhabits these areas too, especially those with deciduous forests.

Similar to *cervus* is the Asiatic *L. dybowsky* Parry which inhabits the Far East tree forests. *L. cervus* is known in forests from the extreme western part of the USSR to the Volga river in the East and to the Baltic Sea area in the north, but there the beetles are rare, only a small quantity of them having been recorded from time to time in the southern part of Latvian SSR.

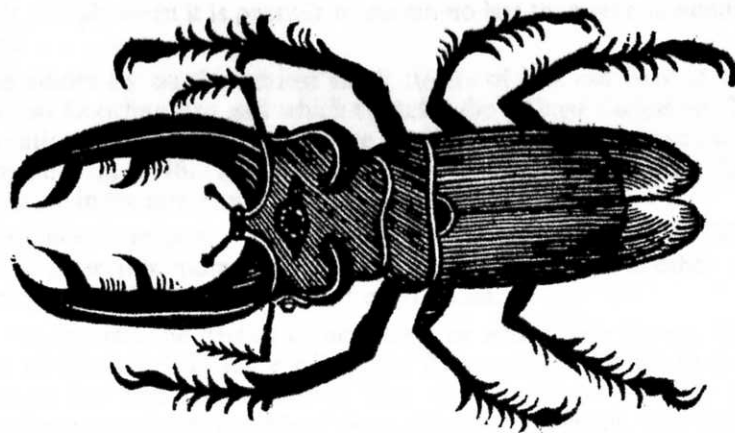
The typical biotope of this species are oak trees as has been noted in all the literature dealing with this species. The large size of *cervus*, whose large horns in the male resemble those of deer (hence the Russian name "deer-beetle") attracted the attention of naturalists many centuries ago. Indeed the essential knowledge about *cervus* is known from early times. The then very common *cervus* was known in early Rome. Gaius Plinius Secundus in his *Historiae Naturalis* wrote about them when he said that the big tree worms (larvae of *cervus*) were common and often collected by the Roman people from oak trees and were called "Cossi".

These worms were used as a delicacy at banquets being often coated first with flour. According to the writings of Teromín the big white worms with black heads were well known in the Pontian and Frigian areas (Black Sea basin and Balkan Peninsula). The inhabitants of these areas collected the larvae that lived in weak trees and the sale of larvae as a choice of food was very profitable.

The Stag beetle was first illustrated and described by Thomas Mouffet in his book *Insectorum sive Minimorum Animalium Theatrum* in 1634 (English translation, *Theatre of Insects*, 1658). Linnaeus later scientifically named this beetle as *cervus*. Alfred Brehm in his monumental work, *Brehm's Tierleben*, (10 volumes on Animal life) gave the known information about *cervus* to the end of the 19th century and noted this beetle as common throughout Europe and typical for oak trees habitats.

The larvae are largish, about the size of a finger, some 10.5 mm long and spend up to four years in trees especially those that are old, big and weak. The pupal state occurs in the fifth year of life and is contained in a cocoon built by the larva from a mix of soil and tree remains and can be as large as a man's fist. This stage lasts at least half a year and emergence of the flying adults takes place in June and July and the longevity of the imago is only some three to four weeks.

In the 19th century it was observed that immense swarms of Stag beetles sometimes occurred and once a large swarm of them was seen to fly into the Baltic Sea off the Lithuanian coast. Many flying swarms were observed in Germany by Kornelius in 1867 at Elberfeld, while Haaber observed the mass flying of *cervus* in 1862 and 1867 in the vicinity of Prague in Czechoslovakia. In 1863 a large quantity of adult beetles was observed near Sonderhausen around an old big oak tree. The many other insects also present included flies and species of hymenoptera such as Apidae species.



The Stag beetle illustrated in Mouffet

Since the last century many drastic changes have taken place in the environment. The number of oak trees and the area of wild forests where they occurred have become much smaller in many areas. Industrialisation has emitted many toxic chemical preparations that have polluted the environment. The active use of insecticides have caused the disappearance of many species of animals from previously recorded habitats. These actions may be dangerous for the entomofauna that



Stag beetles illustrated in Brehm.

need special attention for the preservation of some species. In a recent conference of the Society for the Protection of Mountain Insects held in Erevan it was reported that some colourful, well-known and previously common insects are now very restricted in numbers according to observations in urban and industrial areas of Europe and protection by special legislation which limits or forbids their collection etc. has become necessary. *L. cervus* is now protected by law in Germany and I believe in other countries also.

According to most entomological works the Stag beetle is common in USSR. Many entomologists have observed it in this area but only in small numbers with few actually observed and collected. For example, near Kiev in an extensive forest with oak trees, entomologists usually succeed in capturing from one to three imagos in a day.

Nevertheless some interesting observations have been made on large populations of *cervus* in some habitats. An unusual biotope was recently discovered by this author in Kiev — in the centre of an urban industrial city. The old part of Kiev contains a number of small individual old houses with gardens and narrow streets and roads. This quarter also contains many plants, old trees and vegetable, flower and fruit gardens that are very little polluted by toxic industrial chemical emanations or insecticides.

There are a number of tree species present: big old trees of akazia, apple, and especially many cherry trees, that are extremely attractive to the beetles. These trees are usually suitable hosts for this population of *cervus*. The flight time of the imagos is from the middle of June to the middle of July when it is possible to obtain no less than several hundred insects.

The adults fly on the nearest small streets of this old part of Kiev known as Goncharovka and which contains the Pokrov Cathedral. The observations on this population were made from 1974 and again, more thoroughly, in 1976. The population is relatively stable with little fluctuation in the quantity of insects.

The males commence flying at sundown and continue for 30-40 minutes after this moment. They fly from one tree to another and especially flying is concentrated near cherry trees.

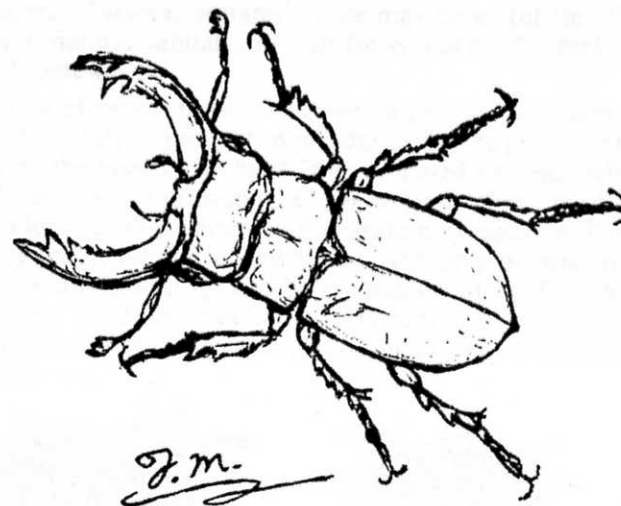
In the daytime the beetles sit near trees or under their leaves. After about 11.00 o'clock in the evening, the flying activity begins to slow, becoming less and less intensive. The males begin to fly near one particular tree and then quickly sit on it, often then crawling from leaf to leaf. The flying beetles are most often observed in sunny warm and especially dry weather when the temperature is around 23-25°C. They are very sensitive to an increase of humidity which will stop the mass flying.

The imagos can remain active flyers even at lower temperatures than 20°C and especially in July and even less towards the end of the season.

The last records collected by the author in 1976 were on 26th July. After this time the beetles were not observed. A captive male from 26th July lived to 14th August in captivity! The females are less active than the males, seldom fly, and usually live on the tree leaves and are far more sedentary than the males to which they are very attractive. It is possible to observe no less than 2-4 males near one female actively fighting each other over her. Generally the number of males is greater than that of the females and may reach as much as about 5-6 males to one female.

During the flight time it is possible to observe 10-15 males for each female. The males at this time are more active and easier for observation than the smaller active females. However Haaber in the nineteenth century once collected to one female about 75 small males near Prague between 11.00 o'clock and midnight.

The males often attack each other when near a female on tree sap. This fighting is well known and has been shown in various illustrations and photos. The big horns of the males are very suitable for these acts. Usually the beetles fight more often in the evening and at night under the dim light then present and they also take advantage of the artificial illumination of streetlights. From this cause the photography of their activity is difficult, for they are inactive during the day when strong sunlight would make for easy photography. This negative phototropism of *cervus* is easy to observe.



The male Stag beetle illustrated by member Frank Marples.

The fights between males is seldom lethal. The male seizes his opponent's body by his horns and tries to throw him onto his back. In captivity, however, the quick death of males under the powerful trauma from the fighting is a common result of the beetles' community life. In captivity, the males show restless behaviour, seek each other out and begin to fight very quickly.

The reactions to females in captivity are less obvious. Egg-laying has not been observed in captivity by the author. The female is but little active in a cage whereas the male begins his restless and chaotic trips in the cage from 21.00 o'clock to midnight. In a large insectarium the males have space in which to fly. This un-natural life and behaviour of captive males is caused by the need to search for females and whereas in the wild they live for three to four weeks, in captivity this is reduced to two to three weeks.

The larvae feed internally in trees, the imagoes feed on the sap of the tree. In captivity they very easily begin to drink sugar solution in water or moistened berries. In the author's experience *cervus* can drink in captivity the sap of various fruits, boiled berries (strawberries, for example) either with or without added water and sugar. They will also accept a mixture of sugar, water, boiled berries, sap and extract of oak leaves and bark. They are very attracted to the clean concentrated water extract from boiled oak bark. They need and must have water and a humid atmosphere, for without water they die quickly within 5-7 days.

They need a relatively small quantity of food, less than 40-50 grains (3gms) per day. From the beginning of July is observed the active wandering of females that usually continues to the middle of July. The author has observed the females near big old trees of akazia and also near fruit trees. They begin wandering in the evening after it becomes dark. The eggs are about 2.25mm in size and oviposition occurs particularly in the bark of trees.

The natural enemies and pathology of *cervus* is little known. Sometimes the beetles die soon after emergence, but the cause is not known (may be a virus — Editor). Ants frequently quickly attack the weak small active beetles on the land. The beetles may also be used as food for birds. The Author has also collected mites from weak living and dead beetles. From one beetle it was possible to collect up to 19 mites. But the role of mites on beetles (parasites or not) is little known or understood.

In Kiev it was observed that a cat was regularly attracted by flying beetles. Each evening this cat would actively attack and pursue them. This active hunting for beetles included both eating them and jumping for flying beetles in the air. Many of the imagoes are also killed in the

streets from cars and man. Also the children, particularly those aged between 10-13 years of age, actively hunt for beetles for they like playing with males and encourage and observe them fighting. The children select the males largest in size with as big horns as possible and have little interest in females or small sized males.

In the life of *cervus* can be noted the details — the typical habitat of *cervus* is oak trees, the beetle being specialised to this tree. But some atypical habitats for the species are also recorded. The Stag beetles have the ability to adapt to other trees. According to Alfred Brehm *cervus* is known in Italy from young ivy. According to Yornostaev in *Insects of USSR* (Moscow 1970), this species does, but not often, exist on some broadleaved trees other than oak, including birch.

The size of the Stag beetles in their Kiev atypical habitat is smaller than normal. For example the many males recorded have a size only about 40-43mm in body length and about 16-18mm in horn length. The female's size can be as large as 40mm, but the majority of the imagoes are less than this. It is possible that overcrowding in the larval stage is responsible, but it may also be caused by the larvae feeding in trees other than oak and this is a problem in need of further research. The fact that they can survive in trees other than oak could be of great advantage to *cervus* for oaks are one of the tree species that are becoming fewer and fewer.

The species is now in need of conservation, particularly of its habitat and where there is already a strong colony. The forming of special microsanctuaries of several hectares in size may be useful for effective conservation of natural habitats, not just for *cervus* but for other plants and insects of some areas.

The collecting of *cervus* from the beginning of July, especially males near the middle of July, is probably not endangering the population since the majority of the insects will by then have mated and eggs will have been laid. Of course the protection of *cervus* and other useful insects from insecticides and other venomous preparations is essential. The main aim should be the protection of the habitat and only occasionally will protection from any collecting also be necessary and the fact that this beetle can adapt to differences in environment can help to have a satisfactory future for this species in the urban and extremely industrial landscape of Europe.

