punktiert; die kurzen Hinterecken sind gerade nach hinten gerichtet und gekielt. Das Schildchen ist schwarz; die Flügeldecken sind dunkel rötlich braun, an der Basis sehr schwach gerundet, etwas verengt und im letzten Drittel gerundet verengt, scharf punktiert-gestreift, mit dicht und fein rauh punktulierten Zwischenräumen, an der äussersten Basis glatt und etwas heller gefärbt. Die Unterseite ist schwarz; die Beine sind gelb, die Schenkeldecken einfach; das dritte Glied der Tarsen ist ziemlich lang gelappt, das zweite kaum merklich. Das Prosternum ist gebräunt.

I. Gruppe.

Das dritte Glied der Fühler ist dem vierten ähnlicher als dem zweiten; die Schenkeldecken sind gezähnt.

13. Psephus prosternalis.

Ater, parum nitidus, sat dense subtiliter flavo-griseo-pilosus; fronte fere plana, antice utrinque subimpressa, parum porrecta, densissime umbilicato-punctata; antennis brunneis, crassiusculis, sat fortiter serratis, articulo 3° 4° submajore, prothorace longitudine parum latiore, tumidulo, a medio rotundatim sat fortiter angustato, densissime subtiliter rugulose umbilicato-punctato, angulis posticis brevibus, haud divaricatis, sat longe carinatis; elytris prothoracis latitudine, ultra medium subdilatatis, apice rotundatim attenuatis, sat subtiliter punctato-striatis, interstitiis postice convexiusculis, dense subtiliter punctulatis; corpore subtus pedibusque obscure brunneo-rufis, antepecto nigro, mucrone prosternali carinato; laminis posticis dentatis. Long. 20 mill., lat. $5^1/_2$ mill.

Njam-Njam.

Schwarz, wenig glänzend, mässig dicht gelblich grau behaart. Die Stirn ist flach, vorn beiderseits schwach eingedrückt und in der Mitte fast abgestutzt, sehr dicht und ziemlich fein nabelig punktiert; der Nasalraum ist kaum breiter als hoch und dicht punktuliert. Die Fühler sind ziemlich kurz, kräftig, braun, stark gesägt; das dritte Glied ist ein wenig grösser als das vierte. Das Halsschild ist etwas breiter als lang, stark gewölbt, sehr dicht und runzlig nabelig punktiert, von der Mitte an nach vorn gerundet verengt; die Hinterecken sind ziemlich kurz, gerade nach hinten gerichtet und ziemlich lang gekielt. Die Flügeldecken sind so breit wie der Thorax, hinter der Mitte sehr schwach verbreitert und dann gerundet verengt, ziemlich fein punktiert-gestreift; die Zwischenräume sind hinten schwach gewölbt, mässig dicht und fein punktuliert. Die Unterseite ist dunkel braun, die Vorderbrust schwarz; die Beine sind etwas heller rotbraun. Der Prosternalfortsatz ist gekielt, der Kiel setzt sich fast bis zur Mitte des Prosternum fort. Die Prosternalnähte sind bis zur Mitte stark vertieft. Das Prosternum ist dicht und grob, die Propleuren sehr dicht und etwas feiner nabelig punktiert. Die Schenkeldecken sind gezähnt.

14. Psephus adeloceroides.

Ater, opacus, sat dense subtiliter brevissime flavo-pilosus; fronte valde declivi, convexiuscula, antice medio foveolatim impressa, creberrime rugulose umbilicato-punctata; antennis fuscis, ab articulo 3° sat fortiter serratis; prothorace latitudine sublongiore, a basi usque ad apicem sensim, apice rotundatim parum angustato, tumidulo, densissime rugulose umbilicato-punctato, medio longe sulcato, angulis posticis subdivaricatis, sat longe carinatis; elytris prothoracis latitudine, postice rotundatim attenuatis, punctato-striatis, interstitiis densissime subtilissime granulose punctatis, basi vage fuscis, epipleuris obscuro-rufis; corpore subtus pedibusque fusco-brunneis; laminis posticis dentatis; suturae prosternali profunde carinulatis. Long. 16 mill., lat. 5 mill.

Sudan.

Schwarz, matt, mässig dicht, fein und sehr kurz gelb behaart. Die Stirn ist stark nach unten gebogen, ziemlich flach, vorn in der Mitte grübchenartig vertieft, sehr dicht runzlig nabelig punktiert; der Nasalraum ist kaum doppelt so breit wie hoch. Die Fühler sind schwärzlich braun und vom dritten Gliede an stark gesägt. Der Thorax ist sehr wenig länger als breit, stark gewölbt, nach vorn allmählich und fast geradlinig, nur an den Vorderecken gerundet, schwach verengt und wie die Stirn punktiert, hinten bis über die Mitte hinaus leicht gefurcht; der Seitenrand ist hinten beiderseits von oben sichtbar; die Hinterecken sind sehr wenig divergierend, scharf und ziemlich lang gekielt. Die Flügeldecken sind so breit wie der Thorax, parallel, im letzten Drittel gerundet verengt, ein wenig bräunlich schwarz, scharf punktiert-gestreift, mit sehr dicht und fein körnig punktulierten Zwischenräumen; die Epipleuren sind dunkelrot. Die Unterseite und Beine sind dunkelbraun, stellenweise verwaschen schwärzlich braun; die Schenkeldecken sind gezähnt. Die Prosternalnähte sind fast wie bei Adelocera bis zu den Vorderhüften vertieft; der Fortsatz ist stark nach innen gerichtet und nicht gekielt.

(Fortsetzung folgt.)

57.8

The Family Tree of Moths and Butterflies traced in their Organs of Sense

by A. H. Swinton.

(continuation.)

The Death's Head Moths are peculiar to the old world, in Europe Atropos is an autumn moth and in Asia and Africa it appears throughout

the year, Thomas Mouffet informs us that the Death's Head Moth flies with a great noise and unable to see well in the night whatever glistering there be of rotten wood, scales of fish, and the like, it greedily follows; there is a popular tale of its entering bee hives and terrifying the bees with its clatter in order to steal their honey; certainly all the Death's Heads, **Acherontia Atropos, Satanas** and **Lethe,** found in Europe or Asia, squeak like a mouse when seized as does the smaller **Styx** the commonest species in Bengal which emits a shriller sound, and many suggestions have been made as to how their cry is made. The common opinion however is that it is produced by the tongue which is shorter than usual in a Sphinx Moth; Mr. Joseph Anderson says in the Entomologist, 'Press the tongue and the noise ceases'; Mr. W. J. Pearce has remarked that on the seventheenth of December 1885 having heard a belated chrysalis of our Death's Head utter a squeak he unsealed the covering of its eyes when he saw the extended tubes of the tongue depressed and pressed together each time the sound was repeated; Dr. H. Landois in his pamphlet „Die Ton- und Stimmapparate der Insekten" affords a conclusive reason that the cry is produced by the file that will be found at the base of the palpi over which the tongue rubs, for he discovered when the palpi were removed the moth could squeak no longer. This escaped the notice of Mr. Moseley who in the volume of Nature for 1872 presented the bibliography on the subject to the reader's notice. Previously when in London in October 1871 I procured a male of the Death's Head which I kept for some time in a cage feeding it on sugar and water that it sucked in with a sidelong mow of the upper side of its proboscis, as it did so it vibrated its wings that resounded through the room like a top running down or the whirr of a fly wheel: if its antennae became clogged it duteously cleaned them with the nail on the tibia of its fore feet, and if its feather scales stuck together it shuffled about until it got rid of them, so that soon it began to look very bad and unsuitable for a cabinet specimen. When allowed to walk it expressed decided satisfaction by stretching out its antennae, and then if touched it squeaked; if held in the hand it squeaked louder and puffed out the first segments of its abdomen which disclosed on either side a whirling, orange coloured, hair fan from a pocket; that spread out like two stars and gyrating as a trundling mop scattered around a scent of jessamine that soon became aluminious and disagreeable. Hence probably arose the fable told by St. Pierre that the inhabitants of the Isle of France, where it seems to be found as well as in Brittany, believed the dust that it cast when flying through an apartment caused blindness: mine had not that power, like all moths when it took into its head to fly around the room it first pumped air into its spiracles by winnowing with its wings, and then transformed into a balloon its flight was owl like and heavy. When the air became light before rain and the footfalls in the street sounded louder, its squeaking became violent and impulsive; at such a time the tick-tick! of the Death Watch Beetle resounds, the nightly hoot and shrieks of the Tawny Owl cause a shiver, and white seagulls a family incubus in Devonshire fly inland; all of which weather prognostics have been accounted death omens for then the patient who feels the change often succumbs, and hence there is reason for the dread depicted in the scull and cross bones on the creatures thorax. After the Death's Head had squeaked like a corncrake or an angry queen bee arousing the hive to swarm, its fans could be seen expanded in the morning twilight: of these scent fans that are sessile on the body a minute anatomical description has been given by Professor Nordman of St. Petersburg, and similar fans it is said constitute the charm exerted over the more indolent sex by the males of the Privet and Convolvulus Hawks, which according to Professor Targioni and others have fans of yellow hair on the two sides of the first abdominal ring which when expanded yield a glandular small of musk, and by that of the olive coloured **Zonilia Morpheus** common in India, Fritz Müller likewise informs us that when the Brasilian Sphinx, **Macrosilia antaeus,** flutters in the hand; two similar pencils of pale hairs that diffuse a musky smell are wont to expand from their grooves beneath the abdomen.

But it choice perfumes express the delight of the male Sphinx when alive the female lies embalmed in death, for Mr. E. K. Robinson has told a strange story concerning the gathering of the keen scented males of the long-tongued Convolvulus Hawk at the commencement of June 1877 in a room forty feet from the ground around the body of a dead female when daylight was about to break in at three in the morning. Nor is it alone the perfect insects that are noisy for the muscular caterpillars of the Sphinx moths make a snap when they wriggle which no doubt they have discovered is useful as a protection in case of assault: Mr. W. C. Gott says in the Entomologist that those of **Langia zenzeroides** that feed on the apricots at Simla in India utter a hiss whereas the moth when it emerges only faintly squeaks; in Canada when you shake the hickory trees on which the caterpillars of **Smerinthus juglandis** are feeding cries of tcep-tcep! it is said, resound, and those of **Smerinthus excaecatus** that there pasture on the beech have been accused of singing.

2. Scent fans are the perquisite of the males of many of the Noctuina whose eyes shine at

night like those of the barn owl as they winnow the dewy flowers; folded into two side pockets at the base of the abdomen like those of the Sphinx Moths and capable of being spread into a fragrant star they are no longer sessile but attached to the extremity of a fleshy arm: commonly they are composed of white, rarely of black hairs, and often they are stained yellow. The Shark Moths, most numerous in Eastern Europe like the Sphingomorpha of South America are easily mistaken for Sphinx Moths; orange fans redolent of turpentine are possessed by the male of **Cucullia umbratica** whose caterpillar feeds on sow-thistles and by that of **verbasci,** whose chinaware caterpillar feeding on mullen, known as would seem to king Soloman as the Towers of Perfume, is a thing of beauty. It is singular that the notched wings of **Phologophora meticulosa** are not possessed by its congeners, its Angle Shade markings resemble those of the Tortrix-like Cosmas and its green caterpillar sometimes noticed on the garden fennel has the lateral lines of the Sphingina; the scent fans of the male are black. Scent fans are employed by the orange-tinted males of **Anchocelis pistacina** and **Orthosia macilenta** and no doubt by their congeners who are tender eyed and readily dazed by light. The pale moths of the genus Leucania as Mr. Stainton has remarked congregate on the misty marsh land, the male of **Leucania congrua** remarkable for the silvery fish-scale irridescence on the under side of its wings and black stomacher of hair, which is flying on the damp meadows that border the Po in September, has its scent fans stained orange; those of the males of the straw-coloured **Leucania conigera, lythargyria** and **pallens,** that start up in July from the long grass in English meadows have yellow or white fans fragrant of ratafia. The grey Daggers, **Acronycta psi** and **tridens,** that slumber on the untarred pailings with a two-handed sword depicted on their wings look alike but the caterpillar of the first has a long hump and a lemon ribbon on its back and that of the latter frequently noticed in the south-eastern counties is reddish with a short hump; the Reverend Mr. Smallwood found that the moths he bred from the latter were smaller and darker; the European species **cuspis** has a caterpillar similar to the first with a short hump: the resemblance of these singular caterpillars to those of the Notodontidae has been noticed by Mr. Butler, the males of the moths have scent fans that diffuse the reviving essence of the vinaigrette.

According to Mr. F. F. Pierce the male of the coal black **Epunda nigra** has scent fans wherewith to captivate its female; the fans of the males of the dingy brown black **Mamestra brassicae** and **persicariae** that come to London in the vegetable carts are sweetly fragrant of the vinaigrette and those of **Apamea basilinea** are vinegary and white: the males of **Xylophasia rurea** that sometimes wander about fir woods, those of **scolopacina** that come to light, and those of **polyodon** that slumber on the garden gate and fly in at the top window, protrude fans from their side pockets that scatter an essence of tansy or turpentine; the brown marbling of these moths serves for protection in the crevices of the bark of trees and on the peaty heather of Scotland the last is often brown black instead of grey brown. The male of the large, black **Mania maura,** which M. Guenée placed in his Quadrifidae on account of the ample hind wings having four branches to the median vein has scent fans that at the close of summer cool the evening air with the fragrance of the vinaigrette, at Guildford it often flew in at the window and was easily mistaken for a bat.

Flat bodied Noctuina that close their wings like a pince-nez such as the root feeding species of Agrotis, Triphaena and Noctua, whose caterpillars are often troublesome in fields and vineyards, apparently have these sexual organs at the extremity of the abdomen; and when they are absent tinsel is supplied in the genus Plusia, on whose courtship Greek letters and metalic splarges inscribed on the wing are calculated to confer the delight of a Chinese festival. As regards the time of flight of these moths I entered in a note book on the 20 of July 1867 at Warsash in Hampshire '**Macroglossa stellatarum** and now **Triphaena interjecta** have connected the activity of diurnal and nocturnal lepidoptera, interjecta commences its flight a little before sunset and when dusk falls **Plusia gamma** comes like a bacchanal in swarms to the flower beds having spent the morning in the meadows where it sleeps at noon'. Perhaps colour selection may be recognised in the wing patterns of these moths, at Guildford there were three varieties of the Common Yellow Underwing, one had pale grey fore-wings, another grey fore-wings with the Noctuina pattern distinct, and a third brown fore-wings, and a series of each looks like three distinct species: here in Devonshire **Abrostula urtice** and **triplasia** have the habit of flying in at the diningroom window, the first in July and the second in August, and since the caterpillars that feed on nettle are pronounced by Mr. Kirby to be after all much alike, I have wondered whether the species are sufficiently differentiated to be considered more than seasonal varieties; anywise we plainly perceive how the species of Noctuina have arisen in ages gone by.

(to be continued.)