CHANGES IN THE STELLAR HEAVENS.

By J. E. GORE, F.R.A.S., Honorary Associate and Vice-President of the Liverpool Astronomical Society.

IF we look up at the starry heavens on a clear, moonless night, all seems still, lifeless, and devoid of energy and motion. All of us are—or at least should be—familiar with the apparent diurnal motion of the star sphere, caused by the actual rotation of the earth on its axis, and with the slower annual motion, due to the earth's revolution round the sun, which brings different constellations into view at different seasons of the year. These motions, due to the great and universal law of gravitation, discovered and so ably expounded by the famous Sir Isaac Newton, are of course wonderful and orderly in their regularity, and bear silent testimony to the amazing power, majesty, and goodness of a great and glorious Creator. There are, however, other motions and changes, even still more wonderful, going on in the depths of space, which, though unperceived by the ordinary observer, have been revealed to the eye and contemplation of the astronomer by the accurate instruments and methods of research which modern science has placed at his disposal. Some accounts of these marvelous discoveries may prove of interest to the reader. The "fixed stars" are so called because they apparently hold a fixed position with reference to each other on the concave surface of the celestial vault, and do not, as far as the unaided eye can judge, change their relative positions as the planets do. Many stars have, however, what is technically called a "proper motion," which, though of course very minute, and only to be detected by the aid of refined and accurate instruments, yet accumulate in the course of ages, and sensibly alter their position in the sky. The largest "proper motion" hitherto detected (about seven seconds of arc per annum) is that of a small star in the constellation Ursa Major, known to astronomers as No. 1830 of Groombridge's catalogue. It has been calculated that this star is rushing through space with the amazing and almost inconceivable velocity of 200 miles per second!—a velocity which would carry it from the earth to the sun in about $5\frac{1}{2}$ days and to the moon in 20 minutes! The well known double star 61 Cygni has a proper motion of about five seconds of arc per annum, both components moving through space together. This is, as far as yet known, the nearest star to the earth in the northern hemisphere. Its parallax, as determined by Sir R. S. Ball, is 0.4676 of a second of arc, and by Prof. Pritchard (by photography) 0.43 of a second. Taking the mean of these values, its distance from the earth would be about 460,000 times the earth's mean distance from the sun, and its actual velocity about 33 miles per second. This is, of course, the motion at right angles to the line of sight, but as it may also have a motion in the line of sight, either to or from the eye, its real velocity is probably greater than this. The remarkable triple star 40 Eridani has a proper motion of four seconds annually. The components are a fourth magnitude star accompanied by a distant double companion which is a binary (or revolving double star), and accompanies the bright star in its flight through space. There are two other faint and distant companions which do not partake in the motion of the ternary star. In the year 1864 the bright star was situated to the east of a line joining these faint companions, but owing to its large proper motion it is now to the west of them. In the case of the triple star Struve 1516, one of the companions, which was to the west of the primary star in 1831, is, owing to the proper motion of the bright star, now to the east of it. Prof. Asaph Hall has found a parallax for 40 Eridani of 0.223 of a second. This, combined with the observed proper motion, indicates an actual velocity of about 54 miles per second. The star Mu Cassiopeie has also a large proper motion. This star, about 4,000 years ago, must have been close to Alpha Cassiopeie, and might have been so seen by the ancient astronomers. The proper motion of the bright star Arcturus is so considerable that in the course of about 30,000 years it will be near the equator, and about 10° to the north of the bright star Spica, from which it is at present separated by over 30° . These motions are of course those which take place across the face of the sky. There are, however, motions in the line of sight—both toward and from the eye—which have of late years been revealed to us by the spectroscopic, that wonderful instrument of modern scientific research, by the aid of which several new metals have been discovered, and which has been found so useful in chemical analysis, and even in the manufacture of steel by the Bessemer process. Some years since, Dr. Huggins, the eminent spectroscopist, found that the bright star Sirius, "the monarch of the skies," was receding from the earth at the rate of about 20 miles a second. Later observations at Greenwich Observatory showed that this motion was gradually diminishing, and within the last few years it has been found that the motion of recession has been actually changed into a motion of approach, showing that this giant sun is probably traveling in a mighty orbit round some as yet unknown center of gravity.

From a consideration of stellar proper motions, it has been concluded that the sun—and therefore the whole solar system—is moving through space. Recent investigations make the velocity of translation about 19 miles per second (30 kilometers). The Greenwich observations place the "apex of the solar motion" (as the point toward which the sun is moving is called) between Rho and Sigma Cygni, while Dr. Huggins' results fix a point near Beta Cephei. Both these points are near the Milky Way.

There are other startling changes which have occasionally taken place among the stars, and which must be looked upon almost in the light of catastrophes. At rare intervals in the history of astronomy "temporary" or "new" stars have suddenly blazed out in the heavens which were previously either unknown to astronomers, or else were invisible, except in the telescope. Some of these were of great brilliancy. In A. D. 173 a bright star is recorded in the Chinese annals as having appeared between Alpha and Beta Centauri (two bright stars in the southern hemisphere). It remained visible for seven or eight months, and is described as resembling "a large bamboo mat" (!)—a not very lucid description. It is worthy of remark that there exists at the present time, close to the spot indicated, an interesting variable star, which may possibly be identical with the bright star of the

second century. Perhaps the most remarkable of these wonderful objects was that observed by the famous Tycho Brahe in 1572, in Cassiopeia, and called the "Pilgrim." It was so brilliant that it rivaled the planet Venus at its brightest, and was visible at noon-day. It remained visible for over a year and then disappeared.

A small star close to its recorded position has been observed in recent years, and as it is thought to be slightly variable in its light, it may possibly be identical with the long lost star of Tycho Brahe. Another new star of almost equal brilliancy was observed in October, 1604, in Ophiuchus, a few degrees southeast of the star Eta Ophiuchi. The planets Mars, Jupiter, and Saturn were close together in this vicinity, and one evening Mostlin, a pupil of Kepler's, remarked that a new and very brilliant star had joined the group. When first seen it was white, and exceeded in brightness Mars and Jupiter, and was even thought to rival Venus in splendor! It gradually diminished, however, and in six months was not equal in luster to Saturn; in March, 1606, it had entirely disappeared. In 1670 a star of the third magnitude was observed by Anthelm near Beta Cygni. It remained visible for about two years, and increased and diminished several times before it finally disappeared. Flamsteed's star, No. 11 of Vulpecula, has been supposed to be identical with Anthelm's star, but Baily could not find that such a star exists. A small star has, however, been observed at Greenwich within one minute of arc of the place assigned to the temporary star by Picard's observations.

Variability has been suspected in this faint star, and according to Hind it has a hazy, ill-defined appearance about it, which may perhaps suggest that it may be a small planetary nebula, similar to Schmidt's new star of 1876 in Cygnus. A small new star was observed by Hind in Ophiuchus on April 28, 1848. When first noticed it was about the fifth magnitude. It afterward rose to about fourth magnitude, but very soon faded away, and, although still visible in the telescope, has become very faint in recent years. A new star of seventh magnitude was found by Pogson on May 28, 1860, in the well known star cluster known as 80 Messier in Scorpio. The light of the star when first seen obscured the light of the nebula. On June 10 the star had nearly disappeared, and the nebula was again seen shining with great brilliancy.

A very interesting temporary star—known as the "Blaze Star"—suddenly appeared in Corona Borealis in May, 1866. It was first seen by the late Mr. Birmingham, of Tuam, Ireland, on the night of May 12, when it was of the second magnitude and equal in brightness to Alphecca, the brightest star in the well-known "Coronet." It must have made its appearance very suddenly, for Dr. Schmidt, the director of the Athens observatory, stated that he was observing this region of the heavens a few hours previously, and noticed nothing unusual. It rapidly diminished in brightness, and on May 24 of the same year was reduced to nearly the ninth magnitude. It was soon discovered that the star had been previously observed, and its place registered by the great German astronomer, Argelander, as of magnitude $9\frac{1}{2}$, so that it is possibly a variable star of irregular period and fitful variability. When near its maximum brilliancy, its light was examined by Dr. Huggins with the spectroscopic, which showed the bright lines of incandescent hydrogen gas in addition to the ordinary stellar spectrum. This implies that the great increase in its light was due to a sudden outburst of hydrogen in the star's atmosphere. Some observers remarked that when viewed with the naked eye it decidedly twinkled more than other stars in the neighborhood, which rendered a correct estimate of its relative brightness somewhat difficult. During the years 1866 to 1876, Schmidt detected variations of light which seemed to show a period of about 94 days, and these observations were confirmed by Schonfeld.

On the evening of November 24, 1876, the late Dr. Schmidt, of Athens, discovered a new star of the third magnitude, near Rho Cygni, in a spot where he was certain that no bright star was visible four nights previously. When first seen, it was somewhat brighter than Eta Pegasi. It did not, however, remain long at this degree of brightness, but rapidly decreased, and on November 30 had faded to fifth magnitude. It afterward diminished very regularly, and in September, 1885, was estimated only fifteenth magnitude with the $15\frac{1}{2}$ inch refractor of Mr. Wigglesworth's observatory. The star was examined with the spectroscopic a few days after its discovery, and showed bright lines similar to the "Blaze Star" in the Northern Crown. One of these bright lines was believed to be identical with Kirchhoff's No. 1474, which has been observed in the spectrum of the solar corona during total eclipses of the sun. This star would seem to be quite new, as there is no star in any of the catalogues in its position. In September, 1877, it was examined with the spectroscopic at Lord Crawford's observatory, and its light was found to be almost entirely monochromatic (of only one color), showing that the star "had changed into a planetary nebula of small angular diameter" (!)

In August, 1885, a star of about seventh magnitude made its appearance close to the nucleus of the Great Nebula in Andromeda—a well known object visible to the naked eye, and which has been well called "the Queen of the Nebulae." The new star was independently discovered by several observers toward the end of August, but seems to have been first certainly seen by Mr. T. W. Ward, of Belfast, on August 19, at 11 P. M. At Greenwich Observatory the spectrum of the new star was found "of precisely the same character as that of the nebula, i. e., it was perfectly continuous, no lines, either bright or dark, being visible, and the red end was wanting." Dr. Huggins, however, on September 9, thought he could see from three to five bright lines in its spectrum. The star gradually faded away, and on February 7, 1886, was estimated only sixteenth magnitude in the 26 inch refractor of the naval observatory at Washington. From a series of measures by Prof. Asaph Hall he found "no certain indications of any parallax," so that evidently the star and the nebula, in which it probably lies, are situated at an immense distance from the earth. Prof. Seeliger has investigated the decrease in light of the star on the hypothesis that it was a cooling body, which had been suddenly raised to an intense heat by the shock of a collision, and finds a fair agreement between theory and observation. Answers point out the similarity between this outburst and the new star of 1860 in the

cluster 80 Messier, and thinks it very probable that both phenomena were due to physical changes in the nebulae in which they occurred.

With reference to the colors of the stars, some of the red stars have been suspected to vary in color. The bright star Sirius is supposed—from the description of it by ancient astronomers—to have been originally red, but this seems very doubtful. The Persian astronomer Al Sufi, in his "Description of the Heavens," written in the tenth century, describes the well known variable star Algol distinctly as a red star. It is now white, and this is perhaps the best attested instance on record of change of color in a bright star.—*Naturalists' Monthly*.

THE COMMON DANDELION.

By FREDERICK LEROY SARGENT.

IN the various names which the dandelion has received, we see expressed, for the most part, either a reference to the tooth-like recurved lobes of the leaves, Fig. 1, or an allusion to the medicinal properties of the plant. Thus, our English name is a modified form of

FIG. 1.

the French *dent de lion*, meaning lion's tooth, and in German we have the same idea expressed in *Löwenzahn*. Fifty years ago this plant appeared in the botanies as *Leontodon taraxacum*, the generic name being derived from the Greek *leon*, lion, and *odon*, tooth, and the specific from the Greek *taraxos*, to stir up, in reference to the effect of a dose. In later works we find the genus *Leontodon*, including the "fall dandelion" (*L. autumnale*), but not the true dandelion, which now appears in a genus by itself under the name *Taraxacum Dens-leonis*. Here the specific name is merely "lion's tooth" again, in Latin.

Finally, in the latest works our plant is given as *Taraxacum officinale*, since this has been found to be the name which, according to the rules of botanical nomenclature, takes precedence of all others. An allusion to the teeth is thus no longer retained, the only reference remaining being to the plant's official use.

To the majority of people the mention of the dandelion calls to mind not so much its medicinal properties as its use for food. Although its cultivation, either as a spring potherb or as a salad with blanched leaves, is comparatively modern, the wild plant seems to have been long valued as a vegetable. There is reason to believe that the Romans made use of it as a pot herb, and Chinese writers of the fourteenth century mention its being eaten in their country, although there is no evidence of cultivation at that time.

There are but few of our flowering plants that grow so widespread over the world. It occurs in North America from the Atlantic to the Pacific coast, in Europe, in Asia, and in the Arctic regions. This extensive range may in part be accounted for by the fact that our plant belongs to the large and aggressive family of the *Compositae*, and is thus related to such invaders as daisies, burdocks, and thistles. Still, the dandelion has more to recommend it than mere family connection; for, despite its lowly aspect, it is no poor relation, but, as we shall hope to show in the present article, it has many virtues of its own which entitle it to respect.

Prominent among these is its adaptability to the different conditions under which it grows. It seems to make the best of everything. If by chance a seed falls upon poor, thin soil, the young plant sends forth, as rapidly as possible, a rosette of leaves pressed close to the earth. And thus, on the principle that "possession is nine points of the law," it secures for its roots the use of a certain amount of territory quite safe from the encroachments of other plants. In rich ground the case is quite different, for here there is so much nutriment in a small quantity of earth, that the struggle for soil is not such a life and death matter as in the less favored localities. Consequently we find a large number of plants crowded together as close as they can stand; and it is obvious that if, under these circumstances, the dandelion should develop a flat rosette of leaves, the grass and other plants growing around would soon overshadow it, and it would have small chance for life.

Our plant, therefore, extends its leaves upward, and does its best to elongate them so as to keep pace with the growth of its rivals. But as these are for the most part grasses and plants which grow by elongation of the stem, the race for sunshine is rather in favor of these other plants, for the reason that a given amount of material put into a stem makes a stiffer organ than when put into a leaf. Still, even with these odds against it, the dandelion seems well able to hold its own, for it probably derives more or less advantage from the recurved lobes, or teeth, which give the plant its name. These are admirably fitted to act in much the same manner as a ratchet; and when the neighboring grasses are blown against the dandelion, a blade may slide along the margin of the leaf toward the base; but, as it springs back from its own elasticity, it cannot slide in the opposite direction, for a tooth will catch it, and thus force it to help support the leaf, and hold it up to the sunshine. We need not stop to consider how the dandelion behaves in soil which is neither very rich nor very poor, for enough has been said to show that it has not much to fear from any rivals it may meet under ordinary circumstances.

It is not only against the aggressions of neighboring plants, however, that our dandelion needs to be pre-

pared. It is at least equally important for its welfare that it have some means of protection against herbivorous animals—not only such as might eat its leaves, but also the more stealthy ones that live upon the food which plants store underground. All such foes it thwarts by a means as simple as it is efficient. Every part of the plant contains a milky juice which is intensely bitter, and a first taste is quite enough to convince the most stupid animal that raw dandelion is not good eating, and most animals know enough to let it severely alone. Curiously enough, however, in this, as in many other cases, it happens that what in nature acts to deter animals from eating the plant, with man offers the chief attraction, for it is this very bitter principle (*taraxacin*) which gives to dandelion greens their peculiar flavor, and affords the essential element in the extract which physicians prescribe.

The store of food, referred to above, which the dandelion accumulates in its root, not infrequently enables it to pass, almost unharmed, through dangers that with less provident plants would surely prove fatal. For example, it must often happen that from drought or from being trampled upon by animals, the leaves become wholly or in part destroyed. Now, if there were no reserve store of food, the plant would have no chance of rallying; but as it is, this food supplies the material for new growth, and upon the return of favorable conditions, fresh leaves are developed, and the plant lives on as before. Primarily, of course, the purpose of this storage of food is to enable the plant to live on from year to year, resting in the winter, and in the spring beginning work again with a good start.

In comparing the higher with the lower plants, the superiority of the former is most beautifully shown in the better provision which is made for the welfare of offspring; and in this regard our dandelion stands among the highest. Before we can understand the ways in which our little plant performs this part of its life work, we must briefly consider the structure of the blossom.

If with a sharp knife we cut a blossom in halves, from the stem upward, the parts represented in Fig. 2

FIG. 2.

will be disclosed. Surmounting the stalk is a cushion-like receptacle, R, from the top of which arise a number of tiny flowers, F, while from the side grow out a series of green scales, S, forming an involucre around the whole. A single one of these florets, Fig. 3, exhibits the following parts: First, a bright yellow corolla, C O, tubular below, but strap-shaped above, as if a tube had been split for part of the way on one side, and the up-

FIG. 3.

per part flattened. Second, five stamens, S N, attached by slender filaments, F M, to the tubular part of the corolla, and with their anthers or pollen sacs, A N, joined together by the edges to form a tube. Third, a single pistil having a long style, S Y, which, above, passes through the anther tube, and bears at its end two diverging stigmas, S G, and below connects by a short neck, N, with the small ovary, O, which contains a solitary ovule. Fourth, a calyx, C X, composed of numerous slender bristles.

The purpose of these complex structures is, of course, in one way or another to secure the development of the ovule into a seed fitted to produce a new plant. This development will proceed only after the ovule has been influenced (*i. e.*, fertilized) by pollen placed upon the stigma; but when once the mysterious process of fertilization has taken place, then there follows immediately those wonderful changes in the blossom which culminate in the ripening of the fruit.

There are but two possible ways in which fertilization may be secured; either the pollen which affects the ovule must come from the same flower (then called close fertilization), or the pollen must come from another flower of the same kind (cross fertilization). Now, while either of these methods will insure the production of a seed, numerous experiments go to show that those offspring which result from cross fertilization are in many ways superior to those which are produced from close fertilization; and it is to the advantages of cross fertilization that we have to look for an explanation of the significance of many peculiar structures, not only of the dandelion, but of flowers in general.

It is obvious that, to secure cross fertilization, there must be some agent to transfer the pollen from one plant to another. Most commonly, either the wind is taken advantage of for this purpose, as with elms, pines, grasses, etc., or else flying insects are induced to perform the office, as is the case with the majority of our familiar flowers. The wind is a very wasteful car-

rier, so that for every grain that is properly placed, thousands, or even millions, may be lost. Insects, on the contrary, waste but little; and, moreover, as Aristotle so shrewdly observed, they habitually confine their visits, for a number of trips, exclusively to the flowers of one species.

The dandelion seems to fully appreciate the great advantages of securing the services of insects, for it appeals most strongly to their love of bright colors and their passion for sweets. As the flowers open, each tiny golden cup is filled to the brim with purest nectar, and he must be a very dull insect, indeed, that cannot see the brilliant head of flowers as far as he can see anything. At any rate, it is not the dandelion's fault if he does not, for the blossom is placed where it will be as conspicuous as possible. If the surrounding herbage is tall, the flower stalk is elongated, so that the crown of flowers may not be obscured. If the plants around are low-lying, it would be wasteful to have a long stalk, so it has a short one, sometimes so short that the blossom looks like a button in the center of the leaf rosette. Economy of material is furthermore shown in the fact that the stalk is always hollow, for it is a principle well known to builders that, when there is required a pillar of a given strength, less material is needed for the tubular form than for the solid cylinder.

But to return to our flower. We have next to consider how the visits of insects are utilized to secure cross fertilization. If we examine the anther tube of a flower that has just opened, Fig. 4, we shall see that the style has not yet protruded, but fills the entire cavity, except such space as is occupied by a quantity of pollen which the anthers have shed. So much of the style as is within the tube is thickly beset with

FIG. 4.

FIG. 5.

hairs that point upward; and when the lower portion elongates, this hairy part brushes the pollen out of the tube, and protrudes, covered with the yellow dust, Fig. 5. At this stage, an insect coming for nectar must rub against the style, and so become more or less covered with pollen. None of it, however, can get upon the stigmas, for they are not yet exposed. After a short time has elapsed, during which much of the pollen has probably been rubbed off, the style is seen to split at the top; and as the halves separate and roll back, Fig. 3, their inner faces (the stigmas) are exposed. If, now, the flower be visited by an insect which has previously been to a younger flower, the pollen he brings will be deposited upon the stigmas as he rubs against them, and cross fertilization will be effected.

Let us suppose, however, that no insect visits the blossom—and this must often happen to such as appear very early in the spring or late in the fall, when hardly any insects are around. In such cases we find that seeds are produced, and therefore we must infer that fertilization has in some way or other been secured. An examination of a flower still older than any we have considered, Fig. 6, will show us what takes place.

FIG. 6.

Here it will be seen that, after the stigmas have diverged, they continue to roll back, until a coil of one or more turns has been made; and as a result of this the stigmatic surface comes in contact with the hairs on the style, and touches the pollen grains entangled by them. Still, the close fertilization thus accomplished is only a last resort, and it can only occur in the event of insects' visits having failed; for when pollen from another flower has once fallen on the stigma, no pollen coming afterward can have the least effect. Thus, we have another instance of the dandelion's ability to make the best of its surroundings.

It even adapts itself to the weather; for when the sun shines, the scales of the involucre bend back, and the blossom is expanded to its fullest extent; but in dull weather, or at night, the scales bend inward, and the blossom is tightly closed. The advantages of this remarkable movement, with its implied sensitiveness, is obvious when we consider that insects are abroad only in sunshine, while at other times there is danger of dew or rain getting into the nectar, and so spoiling it for the insects.

After fertilization has been accomplished throughout the blossom, the involucre closes, and remains closed during the ripening of the fruit. The changes which now take place are as follows: In each flower the corolla, stamens, and style, being of no further use, wither, and sever their connection with the ovary; the ovule develops into a seed containing a tiny plantlet well provided with food for its use during germination;

the ovary grows to keep pace with the seed, its tissues become hardened, and a number of spine-like projections develop near the upper part; and finally the short neck which bears the calyx bristles elongates, pushing upward the withered parts of the flower. At this stage the involucre scales bend back through an arc of about 180°, the cushion-like receptacle becomes almost spherically convex, the fruits radiate in all directions, the bristles spread, and a beautiful cluster of little parachutes is presented to the wind.

Even a glance at one of these fruits, Fig. 7, is sufficient to discover a wonderful fitness for transportation by wind, and more careful study shows that this fitness

FIG. 7.

FIG. 8.

pervades every detail. For example, on examining the bristles microscopically, Fig. 8, it is shown that they are not simple threads, but each is hollow and has numerous projections extending on either side, all of which serves to increase the buoyancy in a very effective way.

The experience of aeronauts has shown that a highly important part in the equipment of a balloon, after the attainment of buoyancy, is the provision of some means of arresting the balloon's progress when the destination has been reached. One of the most successful means which they employ is the grappling hook; and as we find the base of our diminutive parachute provided with a number of upwardly directed spines, it seems fair to conclude that these serve to arrest the fruit upon favorable soil. If it comes to rest upon a smooth surface—which, of course, would be barren—the next breeze would easily blow it away; but if it chance to fall on soil or among other plants, the effect of the spines would be to retain it against the power of even a strong wind. Thus, we may leave it safely landed upon good soil, ready to begin under favorable conditions the cycle of its wonderful life.—*Popular Science News*.

SYSTEMATIC RELATIONS OF PLATYPSYLLUS, AS DETERMINED BY THE LARVA.*

By Dr. C. V. RILEY.

THERE is always a great deal of interest attaching to organisms which are unique in character and which systematists find difficulty in placing in any of their schemes of classification. A number of instances will occur to every working naturalist, and I need only refer to *Limulus*, and the extensive literature devoted, during the past decade, to the discussion of its true position, as a marked and well known illustration. In hexapods the common earwig and flea are familiar illustrations. These osculant or aberrant forms occur most among parasitic groups, as the Stylopidae, Hippoboscidae, Pulicidae, Mallophaga, etc. Probably no hexapod, however, has more interested entomologists than *Platypsyllus castoris* Ritsema, a parasite of the beaver. I cannot better illustrate the diversity of opinion respecting its true position in zoology than by giving an epitome of the more important literature upon it.

J. Ritsema, in *Petites Nouvelles Entomologiques* for September 15, 1869, described the species as *Platypsyllus castoris*. He found it on some American beavers (*Castor canadensis*) in the zoological garden of Rotterdam. He considered it to "undoubtedly" belong to the Suctoria of De Geer, and to form a new genus of Pulicidae.

In the same year, in the *Tijdschrift voor Entomologie*, 2d ser., vol. v., p. 185 (which I have not seen), the same author publishes what is apparently a redescription of the insect. He gives his views more fully as to its systematic position, considering that it belongs to the Aphaniptera, and is equivalent to the Pulicidae.

In the same year, Prof. J. O. Westwood (having previously read a description of the species, November 9, 1868, before the Ashmolean Society of Oxford) published in the *Entomologist's Monthly Magazine*, vol. vi., October, 1869, pp. 118-119, a full characterization of the insect under the name of *Platypsyllus castorinus*. A new order, *Achreioptera*, is established upon the species, which he very aptly likens, in general appearance, to a cross between a flattened flea and a diminutive cockroach. "The abnormal economy of the insect, its remarkable structure, the apparent want of mandibles, our ignorance of its transformations, and the possibility that the creature may be homomorphic in the larva and pupa states," are the reasons assigned for establishing the new order, and here Prof. Westwood is perfectly consistent, as in his famous "Introduction to the Classification of Insects" the Forficulidae are placed in the order Euplexoptera; the Thripidae in the order Thysanoptera; the Phryganeidae in the order Trichoptera; the Stylopidae in the order Strepsiptera; and the Pulicidae in the order Aphaniptera.

In 1872, Dr. J. L. Le Conte published his paper "On *Platypsyllidae*, a New Family of Coleoptera" (Proc. Zool. Soc. of London for 1872, pp. 779-804, pl. lxviii.), in which he shows that *Platypsylla* is undoubtedly coleopterous and cannot possibly be referred to the Aphaniptera. Careful descriptions and figures of anatomical details are given, and he finds that its affinities are very composite, but in the direction of the Adephagous and Clavicorn series. Its most convenient place is

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