II. Observations on the true origin of the gossamer

J.M. Bechstein

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so as to be somewhat stretched. Through each substance the sound was modified in a manner a little different. By resting a stick or other body against the temples, the forehead, and the external cartilaginous part of the ear, sound is conveyed to the interior organs of hearing, as will readily appear if you hold your watch to these parts of another person who has stopped up his ears. From this it appears, as well as from many known experiments made in regard to hearing under water, that in most of our books on the elements of physics, in which in general acoustics have had the undeserved fate of being treated in a much more imperfect manner than other parts of philosophy, sound is very improperly considered only as a vibration of the air, and the theory of it referred to the head of Air. Hearing is nothing else than, by means of the organs of hearing, to be sensible of the tremulous movement of an elastic body, whether this tremulous movement be conveyed through the air, or any other fluid or hard body, to the auricular nerves. It is also essentially the same whether, as is usually the case, the sound be conveyed through the internal part of the ear, or whether it be communicated through any other part of the body. It certainly would be worth the trouble to make experiments to try whether it might not be possible that deaf and dumb people, when the deficiency lies only in the external organs of the ear, the auricular nerve being perfect, could not, by the above method of conducting sound, be made to hear distinctly words articulated as well as other sounds.

II. *Observations on the true Origin of the Gossamer.*

By J. M. BECHSTEIN*.

TO explain the origin of the gossamer is an old problem, which, after a number of experiments, no one, as far as I know, has yet fully solved. Some naturalists have considered

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this phenomenon as the evaporation of plants condensed during the cool days of harvest by the air, and converted into threads like those which can be drawn from resinous juices; others, as the production of a kind of spider, on account of its similarity to the threads of common spiders*: and M. D. C. Pereboom has lately discovered a kind of beetle furnished with a vesicle on its back, from the hinder part of which, on both sides, proceed two threads that extend over the extremity of the body, and end in a double thread, sometimes ten or more ells in length; and this thread is supposed to be what is commonly called the Goffamer.

After many years experience and observations made almost daily when this phenomenon appeared, I flatter myself that

* In the country, during autumn, certain threads are seen hanging from the trees, or extended on the bushes, and even the grass, which, when agitated by the wind, detach themselves from the branches, are transported to others, and are joined or separated at the pleasure of the breeze. People in walking often find their faces, hair, and clothes, covered with them. They are generally called the threads of St. Martin (*filets de St. Martin*), because it is about St. Martin's day that they appear in the greatest abundance. When the moisture of the atmosphere and the dew attach themselves to these threads and become congealed, so that the threads appear thicker and whiter, the peasants call them the hair of the Virgin Mary (*cheveux de la Vierge Marie*). Having one day asked them the cause of this production, they unanimously replied, and without variation, that it was the vapours of the earth, which at that season are thicker and denser. I had no great confidence in this opinion: but I soon learned the real truth; for, being in a field overspread with heath in the time of autumn, I observed that almost all the heath-bushes were covered with spiders webs, and when these were opened I found inclosed in each a spider. These spiders were small, of a red colour, and marked with spots; their feet were short, and the head was large in proportion to the belly. Such spiders webs are found among the low shrubs that grow near the earth, at the bottom of stalks of corn which have been left standing by the reapers, and in the bushes. When the wind is strong it breaks these webs, carries away a part of them, which are scattered over the ground and the trees, and hence come the threads of St. Martin. *Huctiana, Amsterdam 1723, p. 369. EDIT.*

I am able to resolve the problem, respecting its origin. In my opinion the goffamer arises from nothing else than a certain kind of field-spiders, which are, however, so small and active, that they almost always escape notice, unless the observer is endowed with great acuteness of sight. I would call this spider, if it has already no name, the goffamer spider (*aranea obtextrix*): I shall here give a short description and history of it, as far as my knowledge extends.

The goffamer spider (*aranea obtextrix*) is as large as the head of a small pin. On the fore-part of its longish head it has eight grey eyes placed in a circular form; the extremity of the body is shaped like an egg; the body itself is of a shining dark-brown colour; the feet are of a moderate length, and yellowish; and the whole animal is covered with insulated hairs.

These insects first appear in the beginning of October, in woods, gardens, and meadows, where their eggs may be hatched unhurt and unmolested, and thence spread themselves over whole districts, so that during all the month of October and till the middle of November they may be found on the dry fields throughout all Europe; and as they produce a numerous progeny, extensive tracts may sometimes be seen swarming with them. The young, which have not attained to their full growth, are not larger than the point of a pin; they are black, with grey feet, and almost imperceptible to the naked eye. In the beginning of October, when very few of them have been hatched, one observes only in the sunshine a few single threads of their webs, which they extend from twig to twig, or from straw to straw; but about the middle of the month their threads become more perceptible; and towards the end, if people stand or place themselves in such a position that they can see the sun-beams playing on the tender threads, they perceive hedges, meadows, corn-fields, stubble land, and even whole districts, covered with a fine white thick sort of gauze. This spider belongs to that kind which do not weave webs, but only extend single threads

threads from one place to another, and which Linnaeus, on that account, includes in a particular division. The threads, owing to the smallness of the animal, are so delicate that a single one cannot be distinguished by the naked eye unless when the sun shines upon it. A thread, to be visible at other times, must be composed of at least six threads twisted together; and such a thread, as the single ones are exceedingly brittle and do not readily unite, may be again easily divided into its component threads. During the serene calm days of the above months these animals carry on their occupation with great diligence, especially after the morning fogs have disappeared. Between the hours of twelve and two, however, is the period when their great industry excites most admiration. If people are possessed of good eye-sight, or are furnished with a magnifying glass, they may find among the barley stubble such a multitude of these spiders employed in extending their threads, that the fields appear as if covered with swarms of gnats, and they perform their labour so speedily that they seem to fly from one stubble to another.

These tender threads, which are extended over whole fields, particularly in the last half of October, become twisted together by the gentlest breath of wind, and form perceptible threads, that, being broken loose by a stronger wind, are united into thick threads, and even balls, that float through the atmosphere. They are known then in Germany by the name of the *flying summer**, because the summer seems as it were to fly away at the same time. The spiders also are then conveyed along in them; and it is not uncommon to find these animals entwined in such threads which have been caught †.

Al

* In German *fliegende sommer*.

† A singular use which some kinds of spiders make of their webs is, that they serve them instead of carriages to perform long journeys, and to transport themselves from one country to another. At certain times of the year we may generally see, when the sky is serene, a multitude of strong threads and balls formed of the threads of these insects, floating about in the atmosphere.

All the spiders, however, found in these threads or balls, must not be considered as the animals by which they were prepared; for other kinds of spiders, common in harvest, are sometimes entangled in these threads and carried along with them. Thus, for example, the black and white spotted tree-spider, and the so called chestnut-spider, are often found inclosed in the goffamer together with their habitations, and must obey the impulse of the winds.

These webs, which consist of threads closely joined together, serve the insects as nets, in which they catch very small black flies, gnats, and winged tree-lice, the juices of which they suck for their nourishment. The goffamer, therefore, is often found filled with the dried husks of such insects.

The above, in my opinion, is the real origin of the goffamer. But why do these spiders appear only in the time of harvest? why not earlier? and why are they not found like the house and field-spiders throughout the whole summer?—These objections obviate themselves. They appear at that period for the same reason that may-bugs (*maykaffer*) appear in the month of May. They are as necessary in their order to preserve the equilibrium of the balance of Nature as the may-bugs are in May. Single spiders of this kind, however, may be found the whole summer through, as single may-bugs are found in harvest. To those who know that exactly about this time those birds, for whose nourishment insects have been assigned, undertake their emigrations, and that the larks in particular, which are so fond of spiders, then leave us, the above phenomenon will not appear wonderful, but will rather be considered as a wise regulation of Nature. Those who wish to be convinced of the truth of this observation need only to shoot a lark at that period and to open it imme-

sphere; and when these threads and balls are examined, they will always be found to contain spiders, which have prepared these substances to enable them to fly without wings, and to procure themselves an easy passage to other countries. *Théologie des Insectes par Lefser, avec des Remarques de P. Lyonnet. A la Haye, 1742. Vol. I. p. 346. EDIT.*

diately,

diately. These insects, together with the grains of barley which drop from the ears, must indemnify these birds, which stop in many places on their passage in great numbers, for the loss of the summer insects.

After what has been said, I do not think that the whiteness of the threads, which arises from nothing else than the dews that fall at that period, or their clamminess when rubbed between the fingers, not observed in the threads of other spiders, and which is occasioned by the fineness of the threads, that so easily insinuate themselves into the cavities of the skin, can be brought as any objection against this mode of explanation. These phenomena can have no weight unless we ascribe these threads to the common spider. It is likewise very improbable that the gossamer is produced, as M. Percboom asserts, by his beetle; which however must excite our admiration, because, like the spider, it weaves for itself a net, either to serve it as a habitation, or as the means of catching its prey.

III. *Remarks on Mr. SHELDRAKE'S Dissertation on Painting in Oil in the Manner of the Venetians. By Mr. EDWARD DAYES. Communicated by the Author.*

PERSUADED that Mr. Sheldrake labours under a mistake, which may lead others into a practice difficult in itself and dangerous to the durability of their works, I shall offer no apology for the following remarks on his Dissertation*.

That the Venetians primed with distemper, is true; but the colour used was not a *brown*, as stated by Mr. Sheldrake, but a *red*, known at present by the name of *Venetian red*. Some artists at this time employ the same colour, previously calcined, in a new Venetian method: I say a new one, for there are two or three. One of the secrets consists in prim-

* See Phil. Mag. Vol. II. p. 302.