

ON THE
I N J U R Y
DONE TO THE
FOLIAGE OF THE OAKS,

In the NEIGHBOURHOOD OF MANCHESTER, in the SPRING of 1827.

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(Read January 11th, 1828.)

INSECTS, though diminutive in size, and insignificant in appearance, when associated together, in large numbers, frequently become exceedingly formidable and destructive. A striking illustration of this fact is supplied by the appalling devastation which is sometimes occasioned by extensive bodies of locusts; a circumstance thus emphatically described in the bold figurative language of the prophet Joel, ii. 2—6. “A day of darkness and of gloominess; a day of clouds and of thick darkness; as the morning spread upon the mountains: a great people and a strong; there hath not been ever the like, neither shall be any more after it, even to the

years of many generations. A fire devoureth before them ; and behind them a flame burneth : the land is as the garden of Eden before them ; and behind them a desolate wilderness ; yea, and nothing shall escape them. The appearance of them is as the appearance of horses ; and as horsemen, so shall they run. Like the noise of chariots, on the tops of mountains, shall they leap, like the noise of a flame of fire that devour-eth the stubble, as a strong people set in battle-array. Before their face the people shall be much pained : all faces shall gather blackness." From this dreadful scourge, and from other plagues of a similar, though less distressing, character, the inhabitants of the British Isles are, fortunately, in a great measure, exempt. Still they do occasionally experience much inconvenience, both as regards their persons and property, from noxious animals of this class. A multitude of examples, confirming the truth of this remark, might easily be adduced ; but as lengthy details, relative to a matter of such general notoriety, would, in all probability, be deemed superfluous, I shall, in the present instance, limit my observations to a case of recent occurrence ; in which the oaks, in the vicinity of Manchester, were nearly stripped of their foliage, by two minute species of insects.

Early in May, 1827, the green weevil, *Curcu-*

lio argentatus, appeared in unusual numbers in this neighbourhood; and, by its extensive ravages, greatly disfigured many of our most ornamental trees and shrubs; the copper-beech in particular, in some situations, suffered severely. Towards the termination of the month, this indiscriminate feeder attacked the young leaves of the oak, which were then expanding, and the effects of its depredations soon became very conspicuous in the gnawed and withered foliage.

To this pest quickly succeeded another, the larva of a small moth, *Tortrix viridana*, which completed the devastation commenced by the green weevil; and the monarch of the grove, nearly destitute of verdure, and loathsome with numerous caterpillars, stood almost leafless, wearing a wintry aspect, even in the middle of June. These caterpillars, in common with many others provided with an apparatus for spinning, on being disturbed, hastily quit their retreats among the convoluted leaves, and descend towards the earth by a fine line, formed of a viscous secretion, which hardens on exposure to the atmosphere. So extremely abundant were they at the period alluded to, that, during a brisk wind, thousands might be seen thus suspended; some carried out by the breeze far beyond the widest spreading branches of the tree to which their threads were

attached; others, with violent contortions, slowly ascending their silken filaments; and all, as they were wafted to and fro, fantastically dancing in the agitated air, without any visible support; their lines being too attenuated to be discerned by the unassisted eye; except when they occasionally reflected, with a silvery lustre, the vivid light of the unclouded sun. The spectacle, as may be supposed, was at once highly singular and interesting.

During the continuation of these insects in the larva state, various species of the feathered tribes feasted upon them luxuriously. The willow-wrens, white-throats, and, indeed, the warblers generally, were among the most vigilant and destructive of their enemies, and must have reduced their numbers greatly. The finches also, particularly the chaffinch and house-sparrow, were indefatigable in quest of them; and even the domestic poultry sought with avidity for those which, by design or accident, descended to the ground.

In the month of June, they underwent their second change, or were converted into chrysalides; and in this almost inactive stage of existence, in which several of the animal functions are suspended, and others are only imperfectly

exercised, they displayed an instinct deserving particular notice. Concealed within the cavities which they had formed when caterpillars, by folding down the edges of the leaves, and securing them in that position with a little of the glutinous secretion discharged by the spinners, they awaited their final transformation ; - but, as if aware that so confined a situation would present too many obstacles for a delicate and newly disclosed moth to overcome, without incurring a great risk of sustaining injury, at the important crisis, they made their way to the mouths of their retreats, and protruding themselves as far as they could consistently with security, their exterior covering ultimately gave way, and, in July, the insects made their appearance in the imago or perfect state.

Having procured some of the larvæ of this moth, for the purpose of observing the metamorphoses they undergo, and identifying their species, I put them into clean phials of transparent glass, the perpendicular sides of which they readily ascended by means of lines of their own spinning, after the manner of the caterpillar of the goat moth.* This circumstance induced me

* Mr. Curtis, in his *British Entomology*, vol. II. plate 60, has given an excellent figure of this caterpillar, representing it in the act of climbing.

to try the experiment with the larvæ of other insects. Capturing, indiscriminately, such as came in my way, I soon collected a considerable number; and, on introducing them into the phials, found that several of them made their way up the glass without any apparent difficulty, while others were totally incapable of doing so. These ascents, in many instances, were effected by spinning lines, which were made to answer the purpose of a ladder, as noticed above; in some, by the assistance of a slimy or glutinous secretion which left a sensible trace on the glass; and in others, by a method which I cannot satisfactorily explain; the caterpillars, in this case, neither spinning lines, nor leaving any perceptible trace behind them. At first, I was disposed to think, that their spurious legs, or prolegs, (propedes,) as they are denominated by Messrs. Kirby and Spence, in their Introduction to Entomology, acted as suckers; and that they were held to the sides of the phials by atmospherical pressure. It soon occurred to me, that the accuracy or inaccuracy of this supposition might be ascertained by means of the air-pump. Under this impression, I applied to Mr. Dalton, who was so obliging as to allow me the use of his instrument, and to lend me his assistance in conducting the experiment. The result, however, proved the reverse of what I had anticipated;

for, notwithstanding the pressure was very greatly reduced, the caterpillars were still capable of ascending the phial in which they were enclosed: it is probable, therefore, that some adhesive matter, which, perhaps, is not liable to leave a stain upon glass, may be secreted, in small quantities, by the spurious legs of these larvæ; and that they are thus, in opposition to the attraction of gravitation, enabled to climb up the vertical sides of bodies with smooth and even highly polished surfaces. A minute examination of the structure of the false legs, under a powerful microscope, might possibly throw some light on this curious subject, which, it must be acknowledged, merits further investigation.

I hope, at some future period, to have an opportunity of resuming my researches respecting this singular property of the prolegs of several species of larvæ. In the mean time, should the foregoing imperfect attempt to solve this difficult physiological problem, by directing the attention of naturalists to the inquiry, induce a single individual to engage in the undertaking, it will not have been made in vain.

The injury sustained by the oaks on this occasion, was not limited to those which grow in this particular district. I am well informed,

that in other parts of the county, and in Yorkshire, Cheshire, Derbyshire, Shropshire, Middlesex, &c., many were similarly affected; and it is probable, that the mischief extended much further. The damage done to the first leaves was, in a considerable degree, repaired by the developement of a second set, about the close of June, and the beginning of July, the lively tints of which gave to our oak woods, at that season of the year, the appearance of spring; but the bloom, as well as the early foliage, having been nearly destroyed, the crop of acorns, which had promised to be unusually abundant, proved remarkably defective.

Various were the opinions entertained as to the cause of this blight, as it was generally termed; it being severally ascribed to disease; to lightning; to the cold winds which prevailed in the spring of the year; and to the ravages of insects. The last conjecture happens to be correct; but few persons gave themselves the trouble to establish its accuracy by actual observation, and still fewer endeavoured to determine the species of these depredators. Their vast multitudes may, with much plausibility, be attributed to the high temperature of the preceding year, 1826, having been extremely favourable to their increase; for, in the same season, many other

insects were also very numerous; especially the various species of *Aphis*, and their natural destroyers the *Coccinellæ*. Among the latter, *C. 7-punctata*;—*C. 4-pustulata*; and *C. 2-punctata*; greatly predominated. The two last are considered to be distinct, and, accordingly, have had different specific names assigned to them, by entomological writers; but that excellent botanist, and attentive observer of the economy of insects, Mr. Edward Hobson, of Manchester, assures me, that they are opposite sexes of the same species; *C. 2-punctata* being the male, and *C. 4-pustulata* the female. Some observations of my own, made since I have been in possession of Mr. Hobson's communication, had disposed me to regard *C. 4-pustulata* as the male, and *C. 2-punctata* as the female; but I am now convinced, that the colours of the sexes are liable to vary.

NOTE.

Through the kindness of my friend Mr. Peter Barrow, I have been favoured with a sight of the fifty-second number of Mr. Curtis's work on British Entomology, which has been published since the above paper was read before the society.

In treating upon *Coccinella Ocellata*, the author observes, that the genus *Coccinella* "is at once a remarkable example of the value of structure in the combination of groups, and of the little importance of the distribution of colour, when employed to distinguish species. As a genus, *Coccinella* is so natural, that its appellation has never been disturbed; whereas, the species composing it are so variable, that many of them have been described under a great variety of names." Mr. Curtis, without alluding to sexual distinctions, brings together the following synonyms, under the specific name *dispar*. "*Pantherina* and *annulata* Linn. Don. 7.243.2.—*Cipunctata* and *6-pustulata* Linn. Don. 2.39.3.—*unifascia* and *4-pustulata* Fab. Don. 7.243.3.—*perforata* and *7-pustulata* Mar.—*4-punctata* Don. 16.542." Recent researches have induced Mr. Hobson to coincide with me in the opinion, that the distribution of colour affords no criterion which will serve to distinguish the sexes of *C. dispar*.



Blackwall, John. 1831. "On the Injury done to the Foliage of the Oaks, in the Neighbourhood of Manchester, in the Spring of 1827." *Memoirs of the Literary and Philosophical Society of Manchester* 5, 155–164.

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