

zag band of black at about half their length from the base, then greenish blue to the tip, the inner webs fading into white near the extremity; throat and chest yellowish emerald-green, each feather tipped with verditer-blue; middle of the breast and the sides verditer-blue; abdomen and under tail-coverts scarlet; irides dark brown; bill horn-colour, becoming blackish gray at the base; legs and feet yellowish brown.

Length about 12 inches; bill $\frac{1}{2}$; wing $5\frac{1}{4}$; tail $7\frac{1}{2}$; tarsi $\frac{5}{8}$.

Nearly allied to *Platycercus hæmatogaster*. In habits it is a truly grass-feeding parrakeet.

For this beautiful species I propose the name of *Platycercus pulcherrimus*,

And remain, dear Sir, yours truly,
To R. Taylor, Esq. JOHN GOULD.

XVIII.—*On the Means by which various Animals walk on the Vertical Surfaces of highly polished Bodies.* By JOHN BLACKWALL, F.L.S.

PERCEIVING among eminent naturalists and physiologists in this country not only a disinclination to adopt the explanation of the means by which animals of various species ascend the vertical surfaces of highly polished bodies, published in the 'Transactions of the Linnæan Society,' vol. xvi. pp. 487, 767, but also a disposition to adhere to the old and exploded view of the subject, which has been recently introduced into important works on zoology and physico-theology, in the course of last autumn I made several experiments bearing directly upon the remarkable phenomenon under consideration, the particulars of which I shall proceed to state.

Having captured vigorous specimens of the following insects and spiders, *Coccinella vigintiduo-punctata*; the common earwig, *Forficula auricularia*; the hive-bee, *Apis mellifica*; the common wasp, *Vespa vulgaris*; the house-fly, *Musca domestica*; the large flesh-fly, *Musca vomitoria*, *Philodromus dispar*, and *Drassus sericeus*; and having ascertained that they could walk with facility upon the perpendicular sides of a well-cleaned glass-jar, I put into a perfectly dry and clean phial a sufficient quantity of nitrate of silver in a very finely pulverized state to cover the bottom of it to the depth of about one-twelfth of an inch; then holding the phial at various degrees of inclination to the plane of the horizon and turning it round, I distributed in this manner many of the finer particles of the caustic over the whole of its inner surface. Into the phial thus prepared I introduced, in succession, the insects and spiders named above, taking care to renew the nitrate

of silver whenever its efficacy appeared to be diminished, and after they had remained in it a sufficient time for the caustic to act upon the pulvilli of the former and the tarsal brushes of the latter, they were removed into the glass-jar, the vertical sides of which they had previously ascended without difficulty. The result was precisely such as my former researches had led me to anticipate; the insects and spiders were rendered quite incapable of walking on the sides of the jar, and the cauterized papillæ connected with the inferior surface of the climbing apparatus never again resumed their function; yet by the help of their claws the animals were enabled to ascend with ease the perpendicular sides of objects having a slight degree of roughness.

Satisfied that the cauterized state of the papillæ connected with the climbing apparatus was attributable to the agency of the nitrate of silver operating through the medium of a fluid emitted from their extremities, an experiment occurred to me, which, if carefully conducted, promised to render the fluid apparent to the eye when aided by a powerful magnifier. By subjecting the femur, tibia and tarsus of the large flesh-fly and the common house-fly to a moderate degree of pressure, a change was invariably perceived to take place in the appearance of the extremities of the hair-like papillæ on the inferior surface of their pulvilli, which assumed a silvery lustre, evidently occasioned by an increased reflection of light. On passing a finger gently over the papillæ several times in succession, and again examining them under the magnifier, the cause of the augmented brilliancy became obvious, numerous granules of gelatinous matter being discovered upon them, plainly consisting of the coagulated fluid emitted in minute quantities from their extremities, and accumulated together into particles of increased magnitude by the action of the finger, the silvery lustre, at the same time, having disappeared.

Thus it is clearly demonstrable that the papillæ on the climbing apparatus of two very common insects, remarkable for the agility of their movements on polished perpendicular surfaces, emit from their extremities in exceedingly small quantities a fluid coagulable on exposure to the atmosphere; and this deduction from direct experiment may be extended analogically to all those insects and spiders which are capable of walking on the clean, dry, vertical sides of polished bodies.

To these recently ascertained facts I add a succinct review of those previously recorded, which have exercised the most decided influence in removing the difficulties which surrounded the subject of this inquiry, in the hope that such an accumulation of valid evidence, when fairly tested by others, will be considered as establishing the conclusion, that various animals, capable of walking on the clean, dry surfaces of highly polished bodies in opposition

to gravitation, are enabled to adhere to such surfaces, not by the pressure of the atmosphere on their climbing apparatus, as is commonly supposed, but by a viscous secretion emitted from the papillæ with which it is provided.

A large, clean, open phial of transparent glass, containing the larvæ of several species of insects, capable of moving upon polished perpendicular surfaces without the help of lines produced by a spinning organ, was placed in the receiver of an air-pump, from which the air was then exhausted by the usual process; nevertheless, the larvæ continued to traverse the inner surface of the phial in every direction. This experiment was made in the summer of 1827; in conducting it I was assisted by that distinguished philosopher and excellent man the late Dr. Dalton of Manchester, who kindly allowed me to use his air-pump, and remarked, on witnessing the result, that it was physically impossible that the larvæ could be supported on the sides of the phial by atmospheric pressure.

In the next place, I put specimens of the common house-fly into the receiver of an air-pump, and, after having exhausted the air, observed that they walked readily upon its inner surface as long as their vital powers were unimpaired, and that some individuals ultimately died adhering to its sides, from which it required a slight degree of force to detach them. Here, as in the case of the larvæ, it is evident that the insects could not be held to the glass by the pressure of the atmosphere, so that this striking fact supplies an *experimentum crucis* by which the insufficiency of the popular hypothesis to account for the phænomenon it is intended to explain is rendered manifest.

Having cleared the way for a more exact investigation of the subject by the detection of this prevailing error, it occurred to me, that as the adhesion of insects to the upright sides of an exhausted receiver cannot be occasioned by atmospheric pressure, or by any exertion of muscular force, some individuals remaining fixed even after life is extinct, it must be caused by the emission of a viscous fluid from the papillæ on the inferior surface of their climbing apparatus. In order to ascertain whether this is the case or not, I placed in clean phials of transparent glass, spiders and various insects in the larva and imago states capable of walking on their upright sides; then breathing into the phials till the aqueous vapour expelled from the lungs was copiously condensed on their inner surface, I found that the moisture totally prevented the animals from obtaining any effectual hold on the glass; and a similar consequence ensued when the flour of wheat or finely pulverized chalk was thinly distributed over their interior surface, the minute particles of those substances adhering to the tarsal brushes of the spiders, the pulvilli of the perfect in-

sects, and the under side of the feet of the larvæ, which had their efficiency speedily restored, however, on the removal of the impediment by the customary process of cleaning the parts employed by each species.

As a further confirmation of the accuracy of my opinion, I may remark, that on careful and repeated examinations made with lenses of moderately high magnifying powers, in a strong light and at a favourable angle, I never failed to discover visible tracks left by spiders and insects in the larva and imago states when moving in a vertical direction on clean glass. On submitting the matter constituting the tracks to the direct rays of the sun in the month of July, and to the action of brisk currents of air whose drying power was great, I ascertained that it did not suffer any perceptible diminution by evaporation under those circumstances; and it has been shown, in the recent experiments made by employing pulverized nitrate of silver instead of flour, or chalk reduced to powder, and by inspecting under a powerful magnifier the feet of flies when the superior joints of their legs were subjected to moderate pressure, that a fluid, coagulable on exposure to the atmosphere, is emitted in minute quantities from the papillæ on the climbing apparatus of certain animals having the power of walking on the vertical surfaces of highly polished bodies.

In my 'Researches in Zoology,' p. 228, I have stated my conviction, founded on a minute inspection of specimens preserved in spirit of wine, that tree-frogs, *Hylæ*, and the lizards denominated *Geckos*, are enabled to move on the perpendicular sides of polished objects by the agency of adhesive matter emitted from papillæ situated on the inferior surface of their toes; those of the former resemble the papillæ on the pulvilli of the house-fly in their distribution; those of the latter being disposed in transverse fasciæ, somewhat in the manner of the papillæ on the palate of the cow, but with less simplicity; and whoever compares the two, will be led, by analogy of structure and arrangement, to infer, upon physiological principles, that they perform a similar function, though from the different situations of the parts it cannot be applicable to the same purpose.

Such is the brief survey which I proposed to give of the more prominent facts elicited by my investigation of this interesting subject.

It is not at all surprising that a considerable degree of unwillingness should be felt to reject a generally-received opinion which has long been regarded as established, or that a novel one substituted for it should be viewed with distrust or assailed with objections; but it certainly is extraordinary that the evidence by which the one is corroborated and the other subverted should be

suffered to remain without examination. To the simple, satisfactory, and easily-conducted experiments which supply that evidence, I again respectfully solicit the attention of naturalists.

XIX.—*Remarks on the Synonyms of a Homopterous Insect described in the last Number of the 'Annals.'* By ADAM WHITE, Assistant Zool. Dep. Brit. Mus.

IN the last Number of the 'Annals' there are descriptions of some Homopterous insects from the collection of the British Museum. Since the memoir was published, I have seen, for the first time, the text to Guérin's admirable 'Iconographie du Règne Animal' (a work which on the title-page bears the date of 1829–1838, although I see on the *wrapper* it was not finished till 1844, through some mistake of the printer [?]). I find an exceedingly great number of new genera and species of insects not figured in his plates, and on looking over it among the Homoptera saw a description of the *Pæcilo- ptera circulata*, Guérin-Meneville, from the Malay coast, which is certainly the insect I have long subsequently published as the *Pæcilo- ptera Dianthus*, so that this pretty species will now stand as

Pæcilo ptera circulata, Guérin, texte Iconogr. du Règne An. p. 361.

P. Dianthus, White, Proc. Ent. Soc. 1843 (ined.), Annals and Mag. of Nat. Hist. Jan. 1845, p. 36 (cum fig.).

Hab. Malay coast (Guérin), Java (Wilson).

To my description of *Cercopis Charon* (*l. c.* p. 35), I should have added "very near to, if not a variety of, *Cercopis viridans*, Guérin in Belanger, Voy. t. 3. f. 7."

In the text of M. Guérin's work, under the head of the genus *Aphæna*, he complains of the system of changing generic names, such as the one established by him, because not exactly properly compounded. The distinguished professor of zoology at Halle, on this ground, has given the genus alluded to the name *Aphæna*, and in his 'Handbuch der Entomologie,' ii. (we confine ourselves to the portion of his great work dedicated to *Rhynchota*), he has very frequently for similar reasons changed the names.

As a student of Hemiptera and Homoptera I for one raise my pen against this innovation, the more especially as it seems to have been a principle adopted by one of the best French entomologists, the able and amiable Serville, in his work on the Hemiptera in the 'Suites à Buffon'; an admirable book, so far as it goes, the joint production of MM. Serville and Amyot. If names are to be altered because improperly compounded, then let the dictum pass into a law, and many of the genera of Linnæus, Fabricius and Latreille, the fathers of entomology, *must* be changed. A fit of radicalism seems to have fallen upon most of the scientific describers of the present day: "If a name has been twice employed," say some, "in botany or zoology, the name last published must be changed;" others say, "No; if a name be already employed both in botany and zoology, retain them



Blackwall, John. 1845. "XVIII.—On the means by which various animals walk on the vertical surfaces of highly polished bodies." *The Annals and magazine of natural history; zoology, botany, and geology* 15, 115–119.

<https://doi.org/10.1080/037454809495268>.

View This Item Online: <https://www.biodiversitylibrary.org/item/19398>

DOI: <https://doi.org/10.1080/037454809495268>

Permalink: <https://www.biodiversitylibrary.org/partpdf/23845>

Holding Institution

Natural History Museum Library, London

Sponsored by

Natural History Museum Library, London

Copyright & Reuse

Copyright Status: Public domain. The BHL considers that this work is no longer under copyright protection.

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.