tip of the wing; discal transverse vein straight, parted by one-fourth
of its length from the border, and by very much more than its length
from the præbrachial transverse vein.

12. Solita psiloides. Mas. Pallide lutea, tibiis anticus femoribus
halteribusque pallide testaceis, alis cinereis apud venas subluidis vena
transversa discali fusco nebulosa.

Male. Pale luteous, with black bristles. Femora and fore tibiae pale
testaceous. Wings cinereous, slightly lurid along the veins; veins
black, pale luteous towards the base; discal transverse vein clouded
with brown hindward; halteres pale testaceous. Length of the body
5 lines; of the wings 8 lines.

Subfam. Hydromyzides, Fallén.

Gen. Notiphila, Fallén.

13. Notiphila ortalioides. Mas. Nigra, thorace piceo tomentoso,
tarsi picei, alis nigris lituris quatuor interioribus parvis quatuorque
exterioribus majoribus transversis albis.

Antenne as long as the face; third joint linear, much longer than the
second; arista plumose. Thorax with piceous tomentum. Tarsi
piceous. Wings black, with eight white marks; four marks minute,
near the base; four exterior, larger, transverse; discal transverse vein
straight, parted by half its length from the border, and by very much
more than its length from the præbrachial transverse vein. Length
of the body 1½ line; of the wings 3 lines.

Facts relative to the Movements of Insects on Dry, Polished,
Vertical Surfaces. By John Blackwall, F.L.S.

[Read Nov. 17, 1864.]

(Abstract.)

As objections continue to be urged against the opinion that flies
and other insects of various species are enabled to move on the
vertical surfaces of highly polished bodies by the emission of an
adhesive fluid from the numerous hair-like papille distributed
over the inferior surface of their pulvilli, the statement of a few
plain facts for the consideration of dissentients, and especially of
those who still advocate the hypothesis that flies, in such instances
as those referred to above, are supported in their movements
mainly by the pressure of the atmosphere, may, perhaps, be
deemed deserving of attention.
Without the slightest intention to undervalue the importance of microscopic researches into the organization of the parts in question, I may be permitted to remark that the careful observation of phenomena and judiciously selected and skilfully conducted experiments afford equal if not superior advantages with regard to the determination of the function they perform; and that the two methods of investigation should be pursued contemporaneously, and, as far as opportunities will admit, in combination.

Having clearly ascertained by repeated inspections of the pulvilli of flies under the microscope, both in a state of action and repose, that a vacuum cannot possibly be formed between them and smooth surfaces to which they are applied, unless the papillae with which they are provided separately contribute to produce such an effect, it was immediately perceived that a decisive test of the truth or fallacy of this conjecture might be obtained by means of the air-pump, and the result of its application was to demonstrate, not only that flies can traverse the upright sides and the interior surface of the dome of an exhausted receiver while their physical energy is unimpaired, but also to establish the important fact that individuals occasionally remain fixed to the sides of the glass after they have entirely lost the power of locomotion, a circumstance which admits of only one explanation, namely, that an adhesive fluid is emitted from the extremity of their papillae. The sole suggestion hitherto advanced, which has even the appearance of at all affecting the validity of the conclusion thus arrived at, is that the specific gravity of flies is so low that a very slight degree of adhesive power is sufficient to sustain them in the position they occupy; but, low as it undoubtedly is, it greatly exceeds that of atmospheric air, and it is evident that the efficiency of the adhesive agency to support them on a polished vertical surface in vacuo, thus conceded, must be ample to enable them to move on the glass of our windows in perfect security, under ordinary circumstances, without the adventitious aid of atmospheric pressure; the question of specific gravity, therefore, may be safely eliminated as being of no moment in any attempt to solve this interesting physiological problem.

The argument so much relied upon by opponents is, that if flies retained their position on polished vertical surfaces by means of an adhesive fluid emitted from the hair-like papillae on the inferior surface of their pulvilli, they would, after remaining long in one situation, be unable to quit it by any muscular effort they
could employ without seriously injuring those delicate parts, in consequence of the tenacity that the fluid would acquire by desiccation; whereas it is well known that their movements are not in the least impeded by this circumstance. Plausible as this reasoning is, it appears to be based on the erroneous supposition that the properties of the fluid resemble those of animal-glue or vegetable-gum, an assumption which is at variance with all the particulars that have been ascertained in connexion with the phenomenon; in fact, the fluid merely assumes a gelatinous consistency on exposure to the atmosphere, and is readily removed from the pulvilli, when redundant, by the customary mode of cleansing those organs employed by insects, which it could not possibly be were it of the tenacity implied by the foregoing conjecture.

That flies are unable to walk on polished vertical surfaces when breathed upon till the aqueous vapour expelled from the lungs is copiously condensed thereon is an acknowledged fact; but it does not appear to be known that when thus treated they cannot even retain the position they occupy, whether they make any visible effort to do so or not, a circumstance that seems to be quite inexplicable on the hypothesis that they are supported by the agency of atmospheric pressure, but which admits of a satisfactory explanation on the principle of a solvent fluid acting upon a gelatinous and moderately adhesive animal secretion; and these remarks apply to numerous species of insects, and also to spiders provided with scopulse; but the latter, when they perceive their footing to be insecure, frequently attach themselves to the spot by emitting from their spinners a little of the viscid material of which their silken lines are formed that possesses the property of being insoluble in water.

In spring, summer, and autumn house-flies may frequently be seen adhering so firmly to the upright surface of the glass of windows that they are incapable of extricating themselves though they make every exertion to accomplish that object, yet, when breathed upon till the aqueous vapour exhaled is condensed about them, they speedily fall from the spot to which they were previously attached so strongly. Now that this remarkable affection of the house-fly cannot be caused solely by a low state of atmospheric temperature, as it has been surmised, is evident from the circumstance that it often occurs in the hottest period of the year; in the months of July and August 1864, upwards of twenty instances of this curious fact were noticed; it must be ascribed,
therefore, either to feebleness resulting from some other cause, or
to an increase in the adhesiveness of the fluid secretion emitted
from the papillae in the act of climbing. If it should still be in-
sisted upon that the phenomenon is the result of atmospheric
pressure, it behoves the advocates of that hypothesis to explain in
what manner a little condensed vapour causes the liberation of
insects that are unable to accomplish the act by their own unaifed
efforts. That an organ deemed to be capable of so entirely ex-
pelling the air from the space between its extremity and smooth
surfaces with which it is brought in contact as to produce a va-
cuum, should yet be incompetent to effect the exclusion of so
dense a fluid as water, does certainly appear to be in the highest
degree improbable*.

The promptness and celerity of the movements of flies in an
inverted position, or with their backs downwards, on highly po-
lished surfaces, and the certainty with which their hold is imme-
diately secured when they alight upon them, would seem to pre-
clude the possibility of the employment of muscular force on such
occasions adequate to the instantaneous expulsion of the air be-
tween their delicate climbing apparatus and the plain on which
they move, to the extent required for the formation of an efficient
vacuum; but every difficulty is at once obviated by admitting
that a minute quantity of moderately adhesive fluid, which ac-
quires a gelatinous consistency on exposure to the atmosphere, is
emitted from the organs of sustentation. Unexceptionable evi-
dence that such actually is the case has been obtained by obser-
ving that the extremity of each papilla becomes cauterized when
subjected to the action of finely pulverized nitrate of silver; and
that insects, when traversing a vertical surface of glass, leave upon
it a visible and enduring trace of their path, for the better per-
ception of which a lens having a high degree of magnifying power
should be employed.

Though perfectly satisfied that the conclusion deduced by me
from the experiment with the air-pump rests on too secure a basis
to be subverted, yet a desire to remove all apparent difficulties
which may be thought to militate against the view that I have
promulgated of the means by which numerous species of insects
and spiders, and even some reptiles, are enabled to move on dry,

* The adhesion of flies to the glass of windows and to other surfaces, towards
the end of summer and in autumn, is usually caused by the growth from the
interior of the body of a parasitic fungus (*Sporendonema musce*, Fries; *Em-
pusa musce*, Cohn).—G. B.
polished, vertical surfaces, must serve as my excuse for obtunding once more on the attention of naturalists a subject that has been the occasion of so much controversy.

Further Note on a Skeleton of *Dinornis robustus*, Owen, in the York Museum. By Thomas Allis, Esq., F.L.S.

[Read Nov. 17, 1864.]

In my paper on the Dinornis read before the Society on the 16th of June, I stated that the three dorsal vertebrae immediately above the sacrum were normally ankylosed; when we mounted the skeleton we found that was not the case, and we separated all these vertebrae. It was so long since I had employed myself in comparative osteology, that I had forgotten that to have these bones ankylosed is only the normal condition of birds which possess the power of flight; having discovered the mistake, I feel it a duty to acknowledge and rectify it. We also found that we have the first phalæ of the left middle toe; we thought we wanted every bone of that toe: we further found that all the phalanges of the left outer toe, as well as part of the condyle to which they were articulated, have lost the whole of their periosteum, in consequence of their exposure to atmospheric change and influence from their near approach to the external circumference of the sand-drift in which the bird was entombed. I stated that the only figure of the Dinornis to which we had access gave the bird but two sternal ribs. Professor Owen informs me that that had been corrected in vol. iv. (pl. 46) of the 'Zoological Transactions.'

In the report of my former paper I am made to say, "that the middle cervical vertebra had suffered from exposure above the surface of the ground." What I said, or meant to say, was, that they were so high in the sand-drift as to be within reach of the deleterious influence of the atmosphere; while the other parts of the skeleton were at a sufficient depth to be secured from its influence, with the exception of the left toe before alluded to. Had the vertebrae been above the surface, it would have been impossible for so many detached bones to have been preserved in the regular succession in which we find them; the nine cervical vertebrae we have, are evidently the lowest nine in the series.

In the cavities of the sacrum we found a good deal of impal-