vanish, the quantities b, c remain stationary in the above double infinite series; in the two other cases, the b quantities and c quantities *continually* increase in one direction and *continually* decrease in the other, the increase taking place in that direction in which we must read the successions of sign of the derivatives of F so as to begin with passing from plus to minus.

(4) To the increase of b and c there is no limit, but to the decrease of each there is a limit, viz. $a^{\frac{2}{3}} d^{\frac{1}{3}}$ and $a^{\frac{1}{3}} d^{\frac{2}{3}}$ are the limits towards which the b and the c terms respectively converge.

I conclude with remarking that the above theorem is only a particular illustration, and the most simple that can be given, of a very wide theory relating to discriminants of all orders which springs as an immediate consequence from the principles involved in the theory of variation of algebraical forms referred to in the note which I had recently the honour of laying before the Society.

VI. "Some Observations on Birds, chiefly in relation to their Temperature, with Supplementary Additions." By John Davy, M.D. F.R.S., &c. Received May 26, 1865.

(Abstract.)

This paper consists of four parts:

In part first the author gives the results of his observations on the temperature of the common fowl (as many as sixty-two), made at different seasons of the year, showing that the temperature of this bird ranges from 107° to 109° Fahr. *in recto*; that that of the male is a little higher than that of the female, and of both, higher in summer than in winter.

He states that he was induced to pay so much attention to the temperature of the common fowl, from Mr. Hunter having assigned it a temperature no higher than between 103° and 104°, a degree reached by some of the mammalia, and even exceeded.

The second part contains the results of the author's experiments on the air expired by a certain number of birds, and on the air contained in their air-receptacles and bones. They are introduced with some observations on the length of time birds are capable of retaining life under water, from which it appears that it differs greatly in different species, varying from ten minutes, as in the instance of the duck, to half a minute, as in the instance of the owl.

From the analysis of the air expired in the act of drowning, it would appear that there is a certain loss of carbonic acid, equivalent to the proportion of oxygen less than exists in the atmospheric air expired,—a loss, it is inferred, owing to absorption by the blood of the gas which has disappeared, as indeed is indicated by the darkness of colour of this fluid, and confirmed by the effects of exhaustion by the air-pump.

A deficiency, too, of carbonic acid was found in the air of the air-recep-

tacles and in the air contained in the bones, attributable to the same cause.

Of the third part, the subject is pulmonary and cutaneous aqueous exhalation. From the facts brought forward, and the experiments described, there appears to be proof afforded that birds perspire little and cool slowly, and consequently that their high temperature is partly owing to these two circumstances—the one (the latter) attributable to their clothing of feathers, the other (the former) to the little vascularity of their cutis.

The subject of the fourth part is the kidneys and their excretion. As these organs are proportionally large in birds, and as their excretion is very much less liquid than that of the mammalia, it is presumed that, from its carrying off less heat, it may be considered an element in the problem of the high temperature of birds, and that as the compound excreted is chiefly urate of ammonia, it may conduce to a less expenditure of oxygen than if urea were a constituent of their urine.

In conclusion the author suggests that the high temperature for which most birds are remarkable (not all, there being certain exceptions) may be due to a combination of circumstances, some positive, some negative,—the positive chiefly the conversion of oxygen into carbonic acid, the negative those conditions influential mainly by economizing the heat produced or checking its escape. Further, it is conjectured that there may be other ancillary conditions, such as a powerful heart ensuring a rapid circulation, the peculiar structure of the blood-corpuscles, and the little viscidity of the blood of birds.

Some remarks are added on the pneumatic system of birds, so distinctive of their class, with conjectures on its uses, these in part obscure and seeming to require further research for their elucidation.

The supplementary additions are given chiefly in a tabulated form, of which there are five:

The first contains a list of birds examined, altogether 64, of which number 22 were found to have air in some of their bones, and 42 to be without air in them.

In the second the weight of a certain number of species is given (39), and the weight of their feathers, and in most instances of their bones.

In the third the weight of the principal bones of a selected number of species (27) is stated.

In the fourth the composition of some of the bones, as determined by calcination.

And in the fifth the weight of the principal organs of five species.

With the exception of the last, some brief remarks are appended to each Table.