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## A MUSEUM ENEMY—DUST.

By EDGAR R. WAITE, F.L.S.

(Zoologist to the Australian Museum).

Dust is an enemy we are always fighting; every day our rooms are dusted (whether necessary or not!), and once a week, may be, various cabinets containing choice china or other valuable objects are cleared, their contents dusted and replaced. Taken altogether the time occupied in dusting is by no means inconsiderable; to say nothing of the deterioration or danger of damaging the articles of *virtù* so frequently handled.

The principle demonstrated in this essay although thought-out primarily for museum requirements, is alike applicable to general and domestic purposes.

Whilst at the Leeds Museum, I carried out some experiments for Mr. T. Pridgin Teale, M.A., F.R.S., who, at the time, was making observations on dust; more especially with a view to excluding it from cupboards, drawers, &c. As the outcome of these experiments, together with others conducted at his own house and elsewhere, Mr. Teale read a paper before the Manchester Meeting of the Museums Association, entitled—"Dust in Museum Cases, how to battle with it."\*

The subject is so fraught with interest and importance to all who are in any way connected with museums, that no apology is needed for introducing a matter with which museum administrators have so persistently to contend. It is usually the aim of those who are responsible for the well being of a museum, to make their cases dust-proof; but as Mr. Teale points out, this, by all ordinary methods, is impossible. Air is bound to pass in and out of a case, and why? because the pressure is always changing; the barometer shows us this; a rise of the mercury in the tube, indicates that the pressure on our case has been largely increased, and no workman, after these facts have been pointed out to him, will continue to maintain that his fittings will resist a pressure sufficient to burst in the plate glass front. As a matter of fact, the instances are few where the maker claims anything approaching to air-tightness. It will be the experience of most of us, that all except the newest and most modern cases are the very reverse of this. I have myself seen more cases than otherwise, through the chinks of which one could blow out a lighted candle.

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\* Report of Proceedings, 1892, pp. 81—86.

A sunbeam shows how laden with dust is that atmosphere which otherwise appears so pure ; this suspended dust is forced into a case at every increase of pressure. Before the barometer indicates that the pressure has diminished, and that the surplus air is once more passing out, the dust has probably settled on our specimens and labels ; this interchange of air is going on continually and occurs at least twice daily. Apart from barometric influences a high thermometer registers a less pressure on the case: a fall in temperature increasing the pressure, forces in dust-laden air at every point of least resistance.

Although museum labels have been referred to as showing the presence of dust, we need not go beyond our own homes for similar indications :—who has not remarked on the streak of dust across a glazed picture, consequent on a minute hole in the papered back or a slightly puckered mount ; the dust track engendered in a book by a crumpled leaf or folded plate ; or again on a dirty ceiling where the position of the non-porous joists is clearly shown by the lighter color of the plaster ?

It has long been known that when air is passed through cotton-wool the dust is filtered out. Starting with this knowledge, which has been freely applied, Mr. Teale has materially extended our acquaintance with the subject by experimenting with various filtering mediums and showing how such may be used. It is not my province to recount these experiments ; for such my readers are referred to the paper before mentioned. The fundamental idea is, to allow air to enter freely through a large aperture, guarded by a filter suitably mounted. Of those tried, the most effective materials were found to be cotton-wool and cotton-domette.

Our experience at the Leeds Museum was, that very much dust, especially that of a coarser nature, might be arrested by employing such filters. When first put up they worked admirably, but in time the fibres became clogged with dust. If not then taken down and brushed, they acted as dust furnishers ; a certain amount being forced through the fibres every time the air passed into the case.

Whilst making experiments in the Australian Museum by the kind permission of the Curator, who also assisted me in every possible way, it occurred to me that the difficulty might be surmounted in another manner :—by endeavouring to protect the case, not from the dust which the pressure forces in, but from that pressure itself.

Adopting the principle of an aneroid barometer, the wall of a case or drawer is to be transformed from an inflexible to a flexible diaphragm, its contained air separated from the air without by an accommodating but impervious membrane ; the ordinary case is porous on account of its immobility.

Such a perfected case may be aptly compared to a piano, the back of which is covered, for acoustic purposes, with a textile fabric; this has also the secondary and unintentional property of relieving the pressure of air, and guarding the interior of the instrument from the intrusion of dust. There can be little doubt that the efficacy of the filter depends as much upon the flexibility of the material employed, as upon its filtering properties.

In order to put the theory to a practical test, two precisely similar cases were constructed and placed at my disposal. After the joints had been carefully closed, one was fitted with a filter of cotton-demette, and the other with a diaphragm of oiled silk placed on loosely so that sufficient "slack" or "bag" was allowed.

Previous experience had shown that when a filtering material was used, either time or extreme conditions of dust would be required for testing its efficacy. The test cases were supplied with white cards, whereon were placed coins, glass slips and objects designed to register any dust which might be deposited. They were screwed up in August 1894, and placed in the central fish and reptile gallery.

Early in 1895 it was discovered that the roof of this gallery was infested with "white ant" to such an extent that imperative repairs were necessary. This occasioned extreme conditions of dust, and it is not too much to say that the dust created during the removal of the plaster and rotten wood, which process occupied several weeks, was greater than would ordinarily have been formed in many years. The specimens in the two large bird galleries adjoining, which had been screened off, had to be thoroughly cleaned and replaced before the galleries could be reopened, so thickly were they covered with dust. In the light of subsequent events I venture to say, that had the cases been provided with flexible diaphragms, this would not have been necessary.

On opening the test cases (November 1895) in the presence of several of my colleagues, the results were even more conclusive than had been anticipated. Considering the ordeal through which it had passed, the filter had acted well; the dust deposited was very fine, but sufficient in quantity to show in how far it had failed. To finger one's name on the white card on the floor of the case was an easy matter, but the result was more apparent when the coins were lifted. When magnified, a glass slip resembled, to a non-astronomic eye, a photographic negative of the Milky Way.

On the other case, that is, the one provided with the oiled silk diaphragm, being opened, no trace of dust whatever could be discovered, and when placed beneath the microscope, a glass slip

was found to be as clean as when placed in the case fifteen months previously.

The question naturally arises as to whether it is advisable that air in a museum case shall remain unchanged; this is an aspect of the question I do not profess to have studied, but there is one very apparent advantage. In warm climates great trouble is caused by those museum depredators, moths, and particularly the beetles *Anthrenus* and *Dermestes*; the exhibits have to be constantly handled, and the depredators destroyed. In a case constructed as before suggested, in which no interchange of air takes place, the contained air could be poisoned, and would so remain for a long period.

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ON THE SEASONAL CHANGES IN THE PLUMAGE OF  
*ZOSTEROPS CÆRULESCENS*.

By ALFRED J. NORTH, F.L.S.  
(Ornithologist to the Australian Museum).

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In describing *Zosterops westernensis* of Quoy and Gaimard in the "Catalogue of Birds in the British Museum,"\* Dr. R. Bowdler Sharpe makes the following observations:—"An Australian specimen has been described, and it is extraordinary that a bird which seems to be widely distributed on that continent should so much have escaped notice, the only allusion to the species that I can find in Mr. Gould's work being a passage where he mentions that some specimens of *Z. cærulescens* have the 'throat wax-yellow.' It seems to be the *Z. westernensis* (Q. & G.), a species re-instated in the system by Dr. Hartlaub (J. f. O. 1865) p. 20."

With a view of solving the mystery why so common a species should have been overlooked by most writers, I have given this subject my attention for the past two years, by careful observation and the collecting of a number of specimens of *Zosterops* found in the neighbourhood of Sydney. For a liberal supply of these birds every month, from January until the end of August, the thanks of the Trustees are chiefly due to Mr. H. J. Acland, of Greendale, and for a small series of Tasmanian skins to Mr. E. Leefe Atkinson, of Table Cape. Mr. J. A. Thorpe, the Taxidermist, too, has assisted at various times, and from the specimens

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\* Sharpe, Cat. Bds. Brit. Mus. ix., p. 156 (1884).