4. *Thymus serpyllum* :—

a. Ap. 7, Lep. 5, O.I. 17 species ; Ap. 24, Lep. 17, O.I. 58 per cent.
b. ,, 5, ,, 17, ,, 23 ,, ,, 11, ,, 38, ,, 51 ,,
c. ,, 2, ,, 17, ,, 0 ,, ,, 10, ,, 89, ,, 0 ,,

5. *Taraxacum officinale* :—

a. Ap. 58, Lep. 7, O.I. 28 species ; Ap. 62, Lep. 7, O.I. 30 per cent.
c. ,, 0, ,, 2, ,, 1 ,, ,, 0, ,, 66, ,, 33 ,,

6. *Valeriana officinalis* :—

a. Ap. 3, Lep. 0, O.I. 19 species ; Ap 14, Lep. 0, O.I. 86 per cent.
c. ,, 3, ,, 2, ,, 2 ,, ,, 43, ,, 28, ,, 28 ,,

All these species show evidently the predominant part which Lepidoptera play as visitors of flowers in the Alpine region. The same result is arrived at by comparing sister-species or sister-genera of flowers, provided with nearly the same contrivances and growing one or some of them in the Alpine region, another or some others in the lower mountainous region, or in the plain.

7. *Geranium pratense* (a, b), and *sylvaticum* (c) :—

a. Ap. 9, Lep. 0, O.I. 1 species ; Ap. 90, Lep. 0, O.I. 10 per cent.
b. ,, 13, ,, 1, ,, 3 ,, ,, 76, ,, 6, ,, 18 ,,
c. ,, 3, ,, 8, ,, 3 ,, ,, 21, ,, 57, ,, 21 ,,

8. *Veronica chamædrys* (a), and *saxatilis* (c) :—

a. Ap. 5, Lep. 1, O.I. 7 species ; Ap. 38, Lep. 8, O.I. 54 per cent.
c. ,, 0, ,, 4, ,, 3 ,, ,, 0, ,, 57, ,, 43 ,,

9. *Jasione montana* (a), and *Phyteuma michelii* (c) :—

a. Ap. 47, Lep. 7, O.I. 47 species ; Ap. 47, Lep. 7, O.I. 47 per cent.
c. ,, 7, ,, 13, ,, 4 ,, ,, 29, ,, 54, ,, 16 ,,

10. *Carduus crispus* (a), *acanthoides* (b), and *defloratus* (c) :—

a. Ap. 9, Lep. 3, O.I. 3 species ; Ap. 60, Lep. 20, O.I. 20 per cent.
b. ,, 32, ,, 5, ,, 9 ,, ,, 70, ,, 11, ,, 19 ,,
c. ,, 4, ,, 8, ,, 7 ,, ,, 21, ,, 42, ,, 37 ,,

11. *Chrysanthemum leucanthemum* (a), *corymbosum* (b), and *alpinum* (c) :—

a. Ap. 12, Lep. 8, O.I. 49 species ; Ap. 17, Lep. 12, O.I. 71 per cent.
b. ,, 3, ,, 3, ,, 18 ,, ,, 12½, ,, 12½, ,, 75 ,,
c. ,, 0, ,, 4, ,, 5 ,, ,, 0, ,, 44, ,, 55 ,,

12. *Senecio Jacobæa* (a), *nemorensis* (b), *abrotanifolius*, *Doronicum* and *nebrodensis* (c) :—

a. Ap. 15, Lep. 2, O.I. 19 species ; Ap. 42, Lep. 5, O.I. 53 per cent.
b. ,, 7, ,, 8, ,, 2 ,, ,, 41, ,, 47, ,, 12 ,,
c. ,, 1, ,, 20, ,, 14 ,, ,, 3, ,, 57, ,, 40 ,,

The predominant part played by Lepidoptera in the Alpine region would doubtless appear considerably less striking if the more southern or eastern districts of Germany had been compared with the Alps ; for, according to Dr. Speyer,* the number of species of Lepidoptera continually increases in Germany from the north southwards, and from the west eastwards, to such an extent that, for instance, the number of species of diurnal butterflies (Rhopalocera) amounts, near Hamburg, to 72, near Dantzig to 89, near Freiburg (Baden) to 102, and near Vienna to 130. Hence Lippstadt, in consequence of its north-west situation, ranges among the poorest localities of Germany with respect to butterflies ; and the environs of Vienna would possibly have afforded nearly double the number of Lepidoptera as visitors of the above-named flowers. But if even in *a* and *b* of the above statistical notes the number of Lepidoptera be doubled, in all cases, with the sole exception of *Senecio nemorensis*, the Alpine region would retain a decided preponderance as regards the frequency of butterflies that visit flowers, and even *Senecio nemorensis* is not an exception to the general rule, as my observations on this species have not been made near Lippstadt, but in the "Waldstein," one of the summits of the "Fichtelgebirge."

Hence, though further observations may be necessary, I cannot doubt that the increasing proportion of Lepidoptera which visit flowers in the higher Alpine region will hold good, even after the most extensive and thorough examination of the whole of Germany. Some peculiarities of the Alpine flora to be discussed in my next article, will, I hope, confirm this opinion.

HERMANN MÜLLER

* Die geographische Verbreitung der Schmetterlinge Deutschlands und der Schweitz. Von Dr. Adolph Speyer und August Speyer. Leipzig, 1858, p. 29.

THE CHEMISTRY OF CREMATION

IN a paper recently published in a German periodical,* on the chemical bearings of cremation, Prof. Mohr calls attention to a point which, so far as we know, has not yet been considered.

He remarks that, in the first place, it is necessary that the combustion of the body should be *complete*. Anything of the nature of distillation gives rise to the production of fetid oils, such as were produced when in early times dead horses were distilled for the manufacture of sal-ammoniac. Such a revolting process is surely not compensated by the small commercial value of the products obtained. To effect complete combustion we must have a temperature such that the destruction is final, nothing remaining but carbonic acid, water, nitrogen, and ash ; for which purpose a complicated apparatus consuming large quantities of fuel will be necessary. The gases produced can only be destroyed by being passed through red-hot tubes to which excess of atmospheric air can gain access.

On comparing the substances produced by such a total decomposition of the body with those produced in the ordinary course of subterranean decay, it will be seen that one compound is totally lost by burning—the ammonia which results from the decomposition of the nitrogenous tissues. This ammonia, escaping into the air or being washed into the soil, is ultimately assimilated by plants—goes to the formation of nitrogenous materials, and thus again becomes available for animals. In the ordinary course of nature a continuous circulation of ammonia between the animal and vegetable kingdoms is thus kept up : if we stop one source of supply of this substance, we destroy the equilibrium—we draw upon the ammoniacal capital of the globe, and in the course of time this loss cannot but react upon animal life, a smaller amount of which will then be possible. There is no compensating process going on in nature as is the case with the removal of atmospheric oxygen by breathing animals—we deduct from a finite quantity, and the descendants of present races will, in time to come, have to bear the sin of our shortsightedness, just as we have had to suffer through the shortsightedness of our ancestors, who destroyed ruthlessly vast tracts of forests, thereby incurring drought in some regions and causing destructive inundations in others.

Another loss of ammonia is entailed by civilisation in the use of gunpowder. Nitre results from the oxidation of ammonia, and is a source of nitrogenous compounds to plants, which again reduce the nitrogen to a form available for ammonia. The nitrogen liberated by the explosion of gunpowder adds to the immense capital of the atmosphere, but is no more available for the formation of plants. Every waste charge of powder fired represents a certain loss of life-sustaining material against which the economy of nature protests. The same is to be said of nitro-glycerine, gun-cotton, &c., which contain nitrogen introduced by the action of nitric acid.

Wood and coal are other illustrations of finite capital. Every pound of these substances burnt in waste—consumed, that is, without being made to do its equivalent of work—is a dead loss of force-producing material, for which our descendants will in the far-distant future have to suffer. The changes brought about by the cessation of one large supply of ammonia may be compared with geological changes which, though of extreme slowness, produce vast changes in the lapse of ages. R. M.

A NEW MATERIAL FOR PAPER

THE grass known as Canada Rice (*Zizania aquatica*, Lin., *Hydropyrum esculentum*, Link) is well known to American botanists as a cereal. Linnæus names it, as long ago as 1750, in his "Philosophia Botanica," under the

* Daheim No. 44.