We are probably yet a long way from any simple method, suited for general adoption, for observing the *true temperature of the air* at any place by means of the thermometer, so as to eliminate completely the disturbing influence of radiation as regards the thermometer and its protecting screen, or box. This is a problem which may well engage the serious attention of the chief observatories of this and other countries for some years to come. The inquiry may be conducted by ascertaining the true temperature of the air at different hours and seasons by Joule's method, described in a communication to the Philosophical Society of Manchester, November 26, 1867, and comparing the results with those simultaneously obtained by thermometers protected in boxes of different constructions and materials. On this point Wild's paper contains some very valuable observations —valuable, not because they are conclusive, but because they are suggestive, as indicating the line of inquiry which should be pursued. In the meantime all that can be secured is *uniformity*, which would be sooner attained if meteorologists recognised that the following positions of the thermometer are, on physical grounds, inadmissible in researches into the horary fluctuations of the temperature and humidity of the air, viz. the roofs of houses, close or near to walls, over bare soil, in the shadows of trees, walls, or other obstructions, or outside windows. Let it be recognised that observations made under these conditions are of less, and in most cases of no value, then the adoption of 4 ft. as the standard height would follow, and with it the question of uniformity would be almost, if not altogether, settled.

As regards *rain-gauges*, the Congress adopted as the best form for the receiver of the rain-gauge the circular one, with a diameter of 14 in., and at a height of 3 ft., or better 4½ ft., above the ground, a decision which was agreed to by all the delegates except Mr. Buchan, who lodged his protest against it. We have taken the trouble of looking over Mr. Symons' last published *British Rainfall*, and observe that there are not more than half a dozen gauges in the British Isles of this dimension. The readers of NATURE are no doubt aware of the extensive experiments and observations made on this subject in England for some years past, and published annually in the *British Rainfall*, from which it has been experimentally proved that gauges of all sizes from 3 in. to 24 in. inclusive collect amounts not differing more than 2 per cent. from each other. We have had a communication from Mr. Scott, by which we are glad to learn that the Meteorological Office has resolved to retain at its stations the 8 in. gauges hitherto in use. This decision as to the size of the gauge a future Congress will no doubt rescind. Equally in error is the decision as regards height of gauge above the ground, especially large gauges. It is certain from numerous observations made on the subject, that gauges placed at from 3 ft. to 4½ ft. above the ground will not indicate with sufficient correctness the amount of the rain which falls at the place of observation in cases where wind accompanies the rain, owing to the disturbance caused by the obstruction offered by the gauge itself, and by the eddies generated within the funnel. Now owing to the enormous dragging influence of the earth's surface of the wind, these disturbing effects are reduced several fold at the surface and at one foot above it as compared with 3 to 4½ ft. high. On these grounds we cannot recommend British Meteorologists to follow the decision of the Congress. Owing to the extreme variableness of the rainfall, particularly in such countries as Great Britain, where the surface is so uneven, the proper observation of the rainfall requires twenty times more observers than are required to observe any of the other meteorological elements. It is therefore well that a cheap gauge is also a good one, since it facilitates an adequate observation, through numerous observers, of the rainfall, which from its practical and scientific bearings it is so important to know.

In fixing the hours of observation it is essential that those hours be selected which give approximately the mean temperature of the day. The combination of hours which seems to have been most approved both at the Leipsig Conference and the Vienna Congress, and referred to by some very able meteorologists as unconditionally the best, is 6 A.M., 2 P.M. and 10 P.M. The merits of this combination consist in the equal interval of eight hours between the observations, in the close approximation to the daily mean temperature it affords, and in its suitableness for tri-daily charting of the weather. It is, however, a combination of hours which, since it all but absolutely excludes the hours of occurrence of the daily thermometric, barometric, and hygrometric extremes and means, cannot be recommended as generally suitable for meteorological observations of all countries. Indeed, its adoption in tropical and sub-tropical countries would be a blunder. As generally suitable for all latitudes, and for the observation of the principal daily atmospheric phases of temperature, pressure, &c., the best hours are 9 A.M. 3 P.M. 9 P.M., or 10 A.M. 4 P.M. 10 P.M., it being assumed that self-registering thermometers are also used.

We are glad to see that it has been proposed to convene another Meteorological Congress in three years, and hope that some of the questions that form the life-blood of the science will be seriously and adequately discussed by the members of that Congress. The more important of these questions are :—(1) The position and protection of the thermometer for the temperature of the air ; (2) A more satisfactory method for observing the humidity of the air, and of making the deductions therefrom ; (3) The observation of earth-temperatures, especially at and near the surface, and the depth at which fixed thermometers cease to be suitable ; (4) Solar and terrestrial radiation ; (5) The examination of the drying qualities of the air by atmometers, so as to secure comparable results ; (6) A statement of the conditions which anemometrical stations ought to fulfil, so that the instrument shall indicate the true movement of the air over the region where it is placed, or, if this be unattainable, a means of valuing the observations so as to approximate to it ; * (7) Anemometers (Wild's, &c.) for stations of the second order, with which trustworthy observations of wind-force may be made ; and anemometers of velocity which admit of their errors being readily ascertained from time to time ; (8) an adequate nomenclature of clouds ; and (9) the question of atmospheric electricity.

Though the Vienna Congress can properly be regarded as having only concerned itself with questions lying on the outskirts of meteorology, it has done commendable work in thus paving the way for future Congresses, entering on the really important practical questions which united action on the part of meteorologists can alone settle. Until tolerable uniformity be arrived at as regards (1), (2), (5), (6), (7), and (8), in the above paragraph, meteorologists can scarcely be said to have begun to collect data of such a nature as will satisfy our best physicists, and thus lead them to undertake the investigation of the more important of the intricate and difficult problems of the science.

M. COGGIA'S COMET

THE following is an ephemeris to the comet discovered by M. Coggia. It will be seen that the comet will be vastly increased in brilliancy by the month of August.

Berlin Mean time.	R.A.	D.	Brightness (brightness at time of discovery = 1).
	h. m.	° ′	
May 19·5	6 30·9	+ 68 49·4	
28·5	34·34	53·7	
27·5	39·49	59·8	
31·5	45·55	+ 69 8·4	
June 4·5	52·57	19·2	3·8
8·5	7 0·57	31·6	4·5
12·5	10·0	45·1	5·5
16·5	20·17	58·1	6·7
20·5	31·57	+ 70 9·3	8·4
24·5	45·8	16·3	10·6
28·5	59·59	15·2	13·6
July 2·5	8 16·36	0·7	17·8
10·5	56·47	+ 68 15·0	32·3
18·5	9 35·50	+ 62 45·2	64·8
26·5	10 8·57	+ 47 10·9	146·3
Aug. 3·5	21·30	+ 8 52·7	245·0
11·5	10·55	+ 28 17·2	130·8

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 7.—Note on some Winter Thermometric Observations in the Alps, by E. Frankland, F.R.S.

During the past winter the author spent a fortnight at the village of Davos, Canton Granbünden, Switzerland, and had thus an opportunity of experiencing some of the remarkable peculiarities of the climate of the elevated valley (the Prättigän) in which Davos is situated. The village has of late acquired considerable repute as a climatic sanitarium for persons suffering from diseases of the chest.

* NATURE, vol. viii. p. 342.

The peculiar winter climate of Davos appears to depend upon the following conditions :—

1. *Elevation above the Sea*, which causes greater rarity of the air, and consequently less abstraction of heat from the body, and also secures greater transcalency in the atmosphere by a position above the chief region of aqueous precipitation, and comparatively out of the reach of the dust and fuliginous matters which pollute the lower stratum of the air.

2. *Thick and* (*during the winter months*) *permanent snow*, which reflects the solar heat and prevents the communication of warmth to the air, and consequently the production of atmospheric currents. In still, though cold, air the skin is less chilled than in much less cold air, which impinges with considerable velocity upon the surface of the body. The effect of motion through the air upon the sensation of warmth and cold at Davos is very striking. Sitting perfectly still in the sunshine, the heat in mid-winter is sometimes almost unbearable ; on rising and walking about briskly, a delicious feeling of coolness is experienced, but on driving in a sledge the cold soon becomes painful to the unprotected face and hands.

3. *A sheltered position favourable for receiving both the direct and reflected solar rays.*—In this respect Davos-Dörfli, situated opposite to the entrance of the Dischina valley, has the advantage over Davos-Platz two miles lower down the valley, in which latter village the sun rises on December 21 1h. 9m. later, and sets about ten minutes earlier than at Dörfli.

All these conditions contribute not only to a high sun-temperature during the winter months, but also to a comparatively uniform radiant heat from sunrise to sunset.

Addition to the paper, Volcanic Energy: an attempt to develop its true Origin and Cosmical Relations, * by Robert Mallet, C.E., F.R.S., &c.

Referring to his original paper (Phil. Trans. 1873), the author remarks that from the want of necessary data he had refrained from making any calculation as to what amount in volume of the solid shell of our earth must be crushed annually, in order to admit of the shell following down after the more rapidly contracting nucleus. This calculation he now makes upon the basis of certain allowable suppositions, where the want of data requires such to be made, and for assumed thicknesses of solid shell of

100
200
400 and
800 miles respectively.

He tabulates his results for these four assumed thicknesses of shell, and shows that the amount of crushed and extruded rock necessary for the supply of heat, for the support of existing volcanic action, is supplied by that extruded from the shell of between 600 and 800 miles thick, and that the volume of material, heated or molten, annually blown out from all existing volcanic cones, as estimated in his former paper, could be supplied by the extruded matter from a shell of between 200 and 400 miles in thickness.

On data, which seem tolerably reliable, the author has further been enabled to calculate, as he believes for the first time, the actual amount of annual contraction of our globe, and to show that if that be assumed constant for the last 5,000 years, it would amount to a little more than a reduction of about 3·5 m. on the earth's mean radius. This quantity, mighty as are the effects it produces as the efficient cause of volcanic action, is thus shown to be so small as to elude all direct astronomical observation, and, when viewed in reference to the increase of density due to refrigeration of the material of the shell, to be incapable of producing, during the last 2,000 years, any sensible effect upon the length of the day. The author draws various other conclusions, showing the support given by the principal results of this entirely independent investigation, to the verisimilitude of the views contained in his previous memoir.

Linnean Society, May 7.—G. Busk, vice-president, in the chair.—Prof. Thiselton Dyer exhibited a fruit of *Telfairia occidentalis* Hook. f., the seeds of which are used parched by the natives of Calabar, and the young leaves and shoots much prized as a green vegetable. The native name is Ubōng. With reference to the fruit of the *Aristolochia*, hitherto undescribed, Dr. Thomson writes as follows :—"I have seen it, but only so far back as 1859. . . . I cannot trust myself to say more than that the fruit was of a red-brown colour, 5 or 6 in. long, and six-celled, with six well-marked ridges."—Mr. J. R. Jackson exhibited a piece of copal from Zanzibar riddled by ants. After having been some time in the Kew Museum, the living creature was found in the copal and sent to Mr. Walker, who determined it to be a species of *Termes* or white ant, *Eutermes nemoralis* Walk.—The following papers were then read, viz. :—On the discovery of *Phylica arborea*, a tree of Tristan d'Acunha, in Amsterdam Island, in the South-Indian Ocean ; with an enumeration of the Phanerogams and vascular Cryptogams of that island and of St. Paul's, by Dr. J. D. Hooker, vice-president. Labillardière stated in 1791 that the islet of Amsterdam (generally confounded with that of St. Paul), lat. 37° 52′ S., long 77° 35′ E., in the Indian Ocean, was covered with trees, while that of St. Paul, only 50 miles south of it, is destitute of even a shrub. The nature of this arborescent vegetation was unknown until H.M.S. *Pearl* touched at the island in the summer of 1873, when Commodore Goodenough brought off a specimen of what he states to be the only tree growing in the island, together with a fern in an imperfect state. The former proves to be the *Phylica arborea*, of Tristan d'Acunha, and the fern a frond of a *Lomaria*. Amsterdam Island and Tristan d'Acunha are separated by about 5,000 miles of ocean, and are nearly in the same latitude ; and Dr. Hooker discusses the various hypotheses which suggest themselves to account for the extraordinary fact of the occurrence of the same species in such widely separated localities. Near the hot springs on St. Paul's Island *Lycopodium cernuum* is found, an interesting example of the occurrence of a tropical species under special conditions beyond its normal range, a phenomenon of which other instances also occur.—Additions to the lichen flora of New Zealand, by Dr. J. Stirton. Communicated by Dr. Hooker, vice-president. The lichens here described were collected by John Buchanan, of the Colonial Museum, Wellington, N.Z., and include a large number of species now described for the first time.—Enumeratio muscorum Cap. Bonæ Spei, by J. Shaw. The general results arrived at in this paper are summed up as follows : —(1) The great majority of the Cape mosses are of northern-hemisphere types, a few being cosmopolites. (2) Some Australian and New Zealand forms are represented ; a much larger proportion than is the case with flowering plants. (3) Many forms are strictly localised to particular soils and conditions of climate. (4) The moss flora of the Cape is characterised by an almost total absence of Alpine forms.—Contributions to the botany of the *Challenger* expedition :—No. XV. Notes on Plants collected in the islands of the Tristan d'Acunha group, by H. N. Moseley. Communicated by Dr. Hooker. No. XVI. List of algæ collected by Mr. H. N. Moseley at Tristan d'Acunha, by Dr. G. Dickie. Two new species are described.—On a new Australian Sphæromoid (*Cyclura venosa*) ; and notes On *Dynamene rubra* and *D. viridis*, by the Rev. T. R. R. Stebbing. Communicated by W. W. Saunders. This form belongs apparently to a new genus. It was found in Sydney Harbour, under stones at the lowest ebb-tides.—Descriptions of five new species of *Gonyleptes*, by A. G. Butler. These are additional to the monograph of the genus already published by the writer.—Observations on the fruit of *Nitophyllum versicolor*, by Mrs. Merrifield. Communicated by the secretary. The paper contains a description of the coccidia of this species hitherto unknown, although the plant was described in 1800.—On *Hieracium silhetense* DC., by C. B. Clarke. The writer disagrees with Mr. Bentham's identification of this species with *Ainslica angustifolia* Hook. f. et Thoms.—Notes on Indian Gentianaceæ, by C. B. Clarke.—On some Atlantic Crustacea from the *Challenger* expedition, by R. von Willemoes-Suhm. Communicated by Prof. Wyville Thomson, F.R.S. The paper is divided into seven parts as follows :—(1) On a blind deep-sea Tanaid ; (2) On *Cysisoma neptuni* (*Thaumops pellucida*) ; (3) On a *Nebalia* from Bermudas ; (4) On some genera of Schizopoda with a free dorsal shield ; (5) On the development of a land-crab ; (6) On a blind deep-sea *Astacus* ; (7) On *Willemoesia* (Grote), a deep-sea Decapod allied to *Cryon*.

Anthropological Institute, May 12.—Prof. Busk, F.R.S., president, in the chair.—Messrs. R. and S. Garrard and Co., of the Haymarket, exhibited a very interesting collection of gold objects recently brought from Ashanti. In the discussion Col. Harley, C.B., stated that the Ashantis, and indeed all the tribes of and near the coast, could originate nothing ; they were simply copyists, and from frequent repetition of European models, as well as of natural objects, they often attained great skill in the art. —Mr. Francis Galton gave some results of school statistics which he had obtained from Marlborough and Liverpool Colleges. If his applications for co-operation from other head-masters and assistant-masters were equally successful as from these two, he would soon have sufficient material

* Read June 20, 1873 ; Phil. Trans. for 1873, p. 147.

to enable him to establish with certainty the law of growth of the English boys of the present date who are sons of professional men and clergymen and who are educated in the country and reared on the present system of diet and physical and mental work. The result so obtained would serve as a standard of comparison for future periods and for other countries and conditions of life.—A paper, also by Mr. Galton, was read, On the excess of female population in the West Indies.—A paper was read On the probability of the extinction of families, by Rev. H. W. Watson, with prefatory remarks by Mr. Francis Galton. The author remarked that it is not only the families of eminent men, or of the aristocracy, who tend to perish, but also those of municipal notabilities and others. The conclusion that was drawn was that an element of degradation must be inseparably connected with one of amelioration, and that our race is necessarily maintained chiefly through the "proletariat." The problem, which was one purely for the mathematician, was to ascertain what proportion of specified families will necessarily become extinct after a few generations. It would be easy then to measure the diminution of fertility by the frequency of extinction.—Major Godwin-Aussten contributed a paper On the rude stone monuments of the Nágás.

Geologists' Association, May 1.—Prof. Morris, vice-president, in the chair.—On some Carboniferous Polyzoa, by Robert Etheridge, jun. The author showed that, until recently, *Synocladia* was known in this country only from rocks of Permian age, being one of the characteristic corallines of the magnesian limestone. From the Carboniferous series of America, however, a species had been described under the name of *S. biserialis*, agreeing in general habit with the typical *S. virgulacea*, but in some essential characters differing widely. From the Scottish Carboniferous series the author had recently described a species of *Synocladia*, which he termed *Carbonaria*, but which he now believes to be only a well-marked variety of the American Permio-carboniferous *S. biserialis*. The author then proceeded to notice the occurrence of *Polypora* and *Thamniscus* in the Scottish Carboniferous rocks, and concluded by drawing attention to the increasing number of forms, which are gradually becoming recognised as common, in our own country, to the Carboniferous and Permian formations.—On some geological puzzles, by Ed. Charlesworth, F.G.S. Out of many hundreds of teeth of terrestrial mammals, as *Sus*, *Castor*, *Tapirus*, *Felis*, *Hipparion*, *Cervus*, *Bos*, &c., which have been discovered in the red crag of Suffolk and Essex, all, with three or four exceptions, are molars. No bones are found along with the teeth of these land animals. This we can understand, as teeth are so much the hardest parts of the animal frame. There is, however, one curious exception. The *Astragalus* of one or more species of deer is far from uncommon in the red crag. The teeth most abundant in the red crag are those of various kinds of sharks; some of these have a circular perforation, not unlike that made by South Sea islanders in the teeth of sharks at the present day. The occurrence in the red crag of certain stones of a cylindrical form, generally abruptly truncate at one extremity, and having a central cylindrical canal passing through the long axis. Though exhibiting transverse segmental division, if struck with a hammer, they do not separate at the segmental lines. That they did so once may be inferred, from the occurrence of detached segments throughout the crag. The phragmocone of the Belemnite is never found in chalk, or chalk flint, though the guard is extremely abundant. The nature of the cylindrical body, which is occasionally observed to pass in a spiral direction through the body of the Choanite. When a chalk Echinite is filled with flint, but not enveloped more or less in that substance, it is found that the calcite of the shell is partially replaced by silica. This does not occur in those parts of the shell which have flint on the outside.

Glasgow

Geological Society, April 16.—Mr. E. A. Wüncsh, vice-president, in the chair.—Dr. Robert Brown, F.L.S., read a paper On the Noursoak Peninsula and Disco Island, North Greenland.—Mr. David Robertson, F.G.S., then read a paper On the Recent Ostracoda and Foraminifera of the Firth of Clyde, with some notes on the distribution of the Mollusca. The author said there appeared to be too much readiness to adduce climatal change as a cause of varieties in the fauna, which might only be the consequence of local circumstances. For example, *Terebratula caput-serpentis*, an arctic species, is well-grown and abundant in Loch Fyne, but dwarfed and rare at Cumbrae, in the same depth of water and on similar bottoms, which must be attributable to conditions of habitat and not of climate. With regard to the minuter organisms, Mr. Robertson mentioned a remarkable fact, that they are found in greater abundance in many places exposed to the tossings of the sea than in more sheltered bays and lochs. There can be no doubt that such circumstances as the depth of water, the force of currents, and the condition of the sea-bottom, whether it afforded a suitable habitat for certain species, supplying the food best fitted for their healthy development, as well as furnishing them with a degree of immunity from their enemies, such circumstances, often not easily cognisable, would affect the distribution of animal life in the seas of any given period, and account in a great measure for the absence or sparseness of certain species in one locality and their abundance in another.

Paris

Academy of Sciences, May 11.—M. Bertrand in the chair.—M. J. A. Serret communicated some remarks on the note by M. l'Abbé Aoust, inserted in the *Compte rendus* of the last meeting.—M. Jamin presented a paper On the internal distribution of magnetism in a bundle composed of several laminæ.—On the carpellary theory according to the (order) Hippocastanæ, by M. A. Trécul.—General ideas on the mechanical interpretation of the physical and chemical properties of bodies, by M. A. Ledieu.—On the permanence of the intensity of the calorific radiation of the sun, by M. A. Duponchel, a defence of a previous memoir criticised by M. Faye.—Memoir on the determination of the true simple bodies by the actions of electric currents in the voltameter, by M. E. Martin. The author considers the two electricities as imponderable bodies endowed with powerful and opposite chemical affinities, and states views concerning the compound nature of the gases obtained from water by electrolysis, which differ but little in principle from the old theory of phlogiston.—On the mechanical employment of heat, by M. G. West. The author held out hopes of the possibility of utilising the waste heat of engines.—On albuminoid matters, by M. A. Commaille. The author restated the results of his researches on these bodies *àpropos* of M. Béchamp's recent note on the subject. The bodies in question are representable as amides of capronamic acid and of tyrosine, which is the amide of acetobenzoic acid ($C_{18}H_{11}O_6N$).—M. F. A. Abel presented the continuation of his third memoir on the properties of explosive bodies.—Researches on coniferine. Artificial formation of the aromatic principle of vanilla, by MM. F. Tiemann, and W. Haarmann. The formula assigned to coniferine is $C_{16}H_{22}O_8$ + 2 Aq. The substance is a glucoside decomposing in the following manner:—

$$C_{16}H_{22}O_8 + H_2O = C_6H_{12}O_6 + C_{10}H_{12}O_3.$$

This last product of fermentation ($C_{10}H_{12}O_3$) when oxidised by a mixture of sulphuric acid and potassic dichromate gives aldehyde and a crystalline substance identical with the aromatic principle of vanilla having the formula $C_8H_8O_3$. The reaction was thus represented:—

$$C_{10}H_{12}O_3 + O = C_2H_4O + C_8H_8O_3$$

—On the absolute magnetic declinations observed on the Adriatic coast, by M. Diamilla-Müller.—Observations relating to the memoir by MM. Crocé-Spinelli and Sivel on their (balloon) ascent of March 22, by MM. Lartigue. The facts observed by the aëronauts mentioned, confirm the author's view of the origin of the wind known as the "mistral" which may be generally explained by the great difference of temperature existing between the torrid zone and the temperate and glacial zones.

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