

Degrees of Frost

DR. J. SATTERLY, of the Physics Department, University of Toronto, writes to ask whether it is a fact that in England x degrees of frost means a temperature x degrees below 30° F., not x degrees below 32° F., the reason being that English meteorologists consider that the "freezing of plants" or the killing of tender plants by frost does not begin at 32° F. but two degrees lower. The answer to this question is, of course, that both for the public and professional meteorologist x degrees of frost ordinarily means a temperature x degrees below 32° F., but the method of reckoning *ground frosts* adopted by the Meteorological Office is to account as an occasion of ground frost every night on which a thermometer freely exposed to the sky, with its bulb resting on the top of short grass, indicates a temperature of 30° F. or lower. Such a thermometer is peculiarly well placed for recording low temperatures; the underlying turf protects it from heat conducted from the soil; it experiences very little wind, the action of wind being to prevent it from cooling much below the temperature of the surrounding air. The result is that a lower temperature is generally indicated than is reached by plants. This alone would make it improbable that vegetation would suffer frost damage every time the exposed thermometer fell slightly below 32° F., but in addition there is the fact that the freezing point of sap would normally be below 32° F. This official practice is a very old one, and it is difficult to know whether both these considerations were borne in mind by those responsible for it. It is a matter of common observation that there are many occasions when readings substantially lower even than 30° F. are obtained without vegetation suffering; much depends, no doubt, upon the length of time during which the temperature has been below 30° F., and whether any plants exceptionally liable to frost damage are present and also bearing sensitive new growth such as might appear during a sudden spell of unseasonable warmth and moisture.

Origin of Fluted Doric Columns

MISS A. D. BETTS, Thorn Cottage, Byways, Berkhamsted, Herts, writes to suggest that the fluted columns of Greek architecture were copied from plant stems, such as those of an umbelliferous plant. From inquiries we have made upon this subject, it appears that there is a lack of decisive evidence as to these columns having been modelled from plant life, though the subject has been considered on a number of occasions and by various writers. In discussing these columns Whibley ("A Companion to Greek Studies") states, "The origin both of this practice and of the essential form of the column is very obscure". According to the same writer, the earliest of the Doric columns were merely substitutes for wooden tree trunks that had served the same purpose. It is probable that the fluted column may have arisen quite independently of any model or pattern afforded by plant life. No example occurs to us of a woody species indigenous to Greece with a constantly fluted stem or bole. Fluted stems are found not uncommonly

among herbaceous plants. This is particularly noticeable in the family Umbelliferae, where the fluting exhibits greater regularity perhaps than in other families. Regular fluting is also conspicuous on the leaf-sheaths of some of the coarser-growing grasses, particularly when dried, also in certain of the sedges. A large number of umbelliferous plants occur in Greece as in other Mediterranean countries. Many of these have economic uses, and were known and commonly employed by the ancient Greeks on account of their esculent or medicinal properties; for example, fennel (*Foeniculum vulgare*), dill (*Peucedanum graveolens*), cumin (*Cuminum cyminum*), coriander (*Coriandrum sativum*), caraway (*Carum Carvi*). Another species apparently well known to them and occurring in Greece at the present day is the so-called giant fennel (*Ferula communis*), of which it is stated, "the tough stems were used by school-masters as ferules" (Whibley). From an examination of the dried material of this plant the stems do not appear to be conspicuously fluted.

Victorian Physicists

IN his presidential address on January 24 to the Physical Society on "Some Reminiscences of Scientific Workers of the Past Generation, and their Surroundings", Lord Rayleigh urged that the history of science is quite as much involved with the personalities of the men who have made it as is any other kind of history. He suggested that some knowledge of the personalities of the scientific workers of past generations, the conditions of their lives and the points of view from which they worked can often provide a useful corrective to the limitations, narrowness and sacrifice of historical perspective that all too frequently result from the familiar, but necessary, process of digesting original memoirs into text-books. He described many details and incidents, specially valuable and interesting because they derived from personal friendship and acquaintance with the subjects themselves, of Kelvin in his later years, of Dewar and his work at the Royal Institution, of Dewar's remarkable and gifted assistant, Lennox, and his very important share in the liquefaction of hydrogen, of Crookes and his many interests, and of Schuster, an unfortunate victim of the hysterical spy-mania prevalent in England in the early years of the Great War. Lord Rayleigh further urged all those with the good fortune to be in personal contact with the great workers of the generation above them to record such knowledge of this kind as might possibly be valued by posterity, a duty, he considers, which has been too little regarded in the past.

The Soaring Cycle

A NEW journal, the *Soaring Cycle*, has recently been issued by the Soaring Flight Co., Departmental Bank Building, Washington, D.C. (10 pp., 25 cents). The object of this new serial is the promotion of insight into soaring flight by studying that of birds, and the first number consists of about forty extracts from various writers. The general idea is admirable; but it works out rather unfortunately owing to the nature of the material employed. There are three

chief ways in which a bird can fly without flapping : (a) gliding spirally upwards in an ascending current ; (b) using the rapid increase of wind with height near the surface of the ocean during strong winds ; (c) steering so as to use the turbulence within strong winds. The principles involved were laid down by Rayleigh half a century ago. But observers of birds in the tropics have not usually been trained physicists, and have known little of Rayleigh's work or of measurements made in wind-tunnels ; so when they have tried to interpret what they saw, their handling has at times confused the issues. Accordingly, the serial contains extracted statements that one would be sorry to defend : that birds cannot soar in ascending currents when there is no wind (pp. 2, 3), or that a bird can travel over a plain for miles dead on to a gale without change of height or using ascending currents (pp. 3, 5). Soaring without a wind has often been seen ; and sailing for long periods in a gale has been dominated by turbulence so that it has been very changeable in direction. As the last date on an extract is 1923, we hope that the next issue will contain the results of the successful expedition of Idzac to Africa to examine the soaring conditions. Doubtless also use will be made of the experience of the soaring that is now an essential feature of the gliding movement. The interest in soaring and sailing flight is rapidly growing, and tends to air-mindedness ; so all success to this new venture.

Jaguars at the London Zoo

For more than a year, the Gardens of the Zoological Society of London could show no specimen of the jaguar. It is welcome news, therefore, that two fine adults have just been purchased by the Society. The jaguar, the largest of the New World Felidæ, seems now to be by no means common in its native wilds, which range from Texas to Patagonia. To the general public, this animal is of interest on account of its handsome coloration, which appeals even more intensively to the naturalist, who will once more be enabled to make comparisons with the leopard and other spotted cats. For this particular pattern is among them presented in many forms more or less closely correlated with their mode of life. In both leopard and jaguar this pattern takes the form of more or less complete rings of black on a tawny background. With the jaguar a central spot of black is generally present in the centre of the ring. Thus a series of 'rosettes' is formed running in longitudinal lines, forming a 'concealing coloration' in very diverse surroundings ; for both leopard and jaguar are great tree-climbers. This is specially true of the jaguar, which makes its way among the great branches in a series of prodigious bounds in pursuit of monkeys. On the ground, owing to its large size, it is enabled to prey upon animals as large as the tapir, and in times of scarcity on cattle and horses. It displays a marked preference for the neighbourhood of water, where it batters on that giant rodent the capybara, varying its menu with turtles and their eggs, alligators, and fish. Unfortunately, this animal rarely breeds in captivity ; but transferred to Whipsnade, they might be induced to do so.

Culture Contacts in Buckinghamshire

ARGUMENTS for the diffusion of culture are so frequently a matter of inference, resting on a balance of probabilities, that any instance of the effect of extraneous cultural influence, which rests on well-attested historical evidence, is a welcome accession to the material of discussion. An instructive lesson may be derived from a letter from Mrs. Wishaw, the well-known authority on Spanish archæology and cultural history, appearing in *The Times* of January 24, in which she directs attention to the relation between the pillow-laces of Buckinghamshire and those still made on occasion at Niebla in the Province of Huelva, which derives in the English county from the interest taken in it by Katherine of Aragon, the consort of Henry VIII. Not only does Mrs. Wishaw record a tradition still current in Huelva connecting the Spanish princess with the Andalusian lace ; but she also points out that at the present day this lace retains in its *motifs* the prehistoric Egyptian five-petalled lotus and the birds of life on either side brought to Andalusia by Coptic workers, who introduced the art into Spain in the eighth century A.D. under the rule of the Yemenite Arabs. Thus we have a tenuous if well-attested line of connexion between 'prehistoric' Egypt and Britain, which might well have been called in, in default of documentary evidence, to support the famous prehistoric blue faience Egyptian bead (now assuredly crushed under the weight that has been laid upon it!), and to 'prove' the existence of a culture complex in Britain. The moral would seem to be that an attitude of caution is necessary towards the bold hypotheses of cultural movements, which carry no intrinsic evidence of the chronological relation of their component elements. An analogous instance is the resemblance between the arts of early China, Polynesia and Central America, to which attention has been directed, where the time gaps may aggregate as much as two thousand years or more.

Roman Cemetery at Verulamium

THE exploration of Verulamium by Dr. R. E. Mortimer Wheeler has added importance and interest to any finds in what may be termed subsidiary areas in the vicinity. Local archæologists, fortunately, are fully alive to the importance of this branch of investigation in their studies ; and the St. Albans and Hertfordshire Archæological Society has undertaken a comprehensive survey of an area in the parish of St. Stephen, immediately to the south of the site of Roman Verulamium. Here in the churchyard a glass burial urn was found in 1848, and other finds have been made since then at various times, though without any precise records being kept. The work of the survey has been carried out by Dr. Norman Davey, assisted by a band of voluntary helpers. The erection of some cottages on the south side of King Harry Lane, which runs in a north-westerly direction towards the Roman wall from the churchyard, made it possible to collect sufficient evidence to establish the position of forty cremation burials and a brick-lined cremation chamber. A small strip of waste land on the north side of the lane was also thrown open to