

masses, many of an uniform size, separated by the above-mentioned clear, transparent channels.

The general appearance of this transverse section inclined one to regard the stone as built up of a number of conical spicules, with their vertices pointing towards the vertex of the stone.

This was confirmed by the fact that one of the stones, whilst melting, was squeezed between the thumb and finger, and immediately fell apart into three distinct spicules.

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#### Dendritic Patterns caused by Evaporation.

I WAS glad to see the note (with illustrations) published in NATURE (June 23) on this subject. Among the specimens which I did not mention in my paper are two microscope slides similar to those described by Prof. G. H. Bryan. They are botanical slides from the collection in my laboratory at Bedford College, and as they were bought specimens, I was not certain that they had been mounted in glycerine jelly, although I believed it was probably the medium used. I therefore laid them aside for future work, and am now pleased to find the probability confirmed. I wished also to make further experiments on the relation of the structure to the included specimen.

I should like to point out, however, that although the medium does not contain recognisable particles in suspension, we may look upon the jelly as representing material in an extremely fine state of division, as it were, so that the principle of formation may be similar to that in the other slides described.

July 1.

CATHERINE A. RAISIN.

#### Solar Halo of July 3.

IN case it may interest your readers, I write to say that there has been a magnificent halo round the sun, lasting almost without interruption from 4 p.m. to 6 p.m.

It varied in intensity during the time of its visibility, and also in colour. When at its best it was distinctly bluish at its outer margin, shading through yellow to red; the more decidedly green and pink tints of the rainbow seemed to be wanting. But the most conspicuous feature of the apparition was the comparative darkness of the sky within the ring. The halo appeared as if fringing a dark storm-cloud; but that this was not really the case, was evident from the sun's appearance.

All day, in fact for several days past, the sky has been exceptionally much decorated with fantastic cirrus clouds, and this afternoon, at the time of the halo, veils of cirrus concealed almost all the blue; while a lower layer of cumulus clouds drifted up from the west and gradually obscured the sun, halo and all, for a time.

I do not know if the halo formed a complete ring round the sun, as trees partly concealed my view; but I was able to trace it for fully three-quarters of its circumference.

Bradfield, Reading, July 3.

CATHARINE O. STEVENS.

#### A Monochromatic Rainbow.

A CURIOUS rainbow was observed here on Friday evening last. Heavy rain falling in a dark southern sky formed the lower portion of one limb of a bow, extending about 10° directly towards the zenith. The red band alone was visible, and lasted *after sunset* (which occurred at 8.40 for our horizon, and some ten minutes earlier below the Howgill Fells), for a full quarter of an hour.

A. J. K. MARTYN.

Sedbergh, July 3.

#### CAST METAL WORK FROM BENIN.

AMONG the spoils, interesting to ethnologists, brought back from Benin by the punitive expedition under Admiral Rawson, was a large number of elaborately carved elephant's tusks, some of them of remarkable length; various smaller objects in ivory; profusely ornamented wooden panels forming doors and looking-glass frames, and hundreds of objects of great multiplicity of design cast in metal, both in the round and in high relief. The wonderful technical skill displayed in the construction of the metal objects, their lavish ornamentation, much

of which is deeply undercut, and in nearly every case the high artistic excellence of the completed subject, have been a surprise and a puzzle to all students of West African ethnology. If they have now begun to recover from their surprise that work of such excellence, indicating skill born of long experience, should have come to light from among so barbarous a race, and that no whisper of its existence should have reached Europe, notwithstanding its great abundance (as attested by the numerous pieces exposed in London and provincial auction rooms, in addition to the hundreds of plaques and figures sent to the British Museum); there has, at all events, been as yet no elucidation of the mysteries—who were its manufacturers, where and when was it executed, and whence did they derive the knowledge of this art?

Although the city has been described as being, in the middle of the seventeenth century, "of greater civility than to be expected among such Barbarous People," none of the travellers who, within the past two or three hundred years, have left accounts of their visits to Benin, have described this metal work as a special feature of interest there. If the amount that has already found its way to Europe had been displayed in the king's or chiefs' houses, or in their public buildings, it could not surely have failed to attract attention and remark. The artificers and their appliances for the manufacture of works, on so large a scale, could hardly also, one would suppose, escape notice, or be passed over in silence, if observed. More than one traveller mentions seeing blacksmiths at work and turning out good workmanship, "considering the appliances they have"; but no foundry work or modellers in clay or wax are referred to.

Tusk-holders in the form of human-headed vases have certainly been alluded to; and the nearest approach to a description of the plaques is the "melted copper whereon are Ingraven their Warlike Deeds and Battels, kept with exceeding curiosity," mentioned in Ogilby's collection of African travels. Few, however, if any, of the plaques brought to Europe display warlike deeds or battle scenes. The accompanying illustrations are taken from examples lately acquired by the City of Liverpool, and described by Dr. Forbes in vol. i. No. 2 of the *Bulletin of the Liverpool Museums*—a recently established periodical, intended to make known the contents of the Derby (or Zoological) and the Mayer (or Ethnological) Museums, and the results of the investigations carried on in the laboratories attached to them.

Fig. 1 represents a small plaque, used as a lid of a box, or perhaps as a pendant, in which the king or some high personage is shown, supported by two slaves; while in Fig. 2, is illustrated one of the human-headed vases which sat on the altar in the king's principal Juju-house, supporting a carved elephant tusk. The head-dress of this figure is a network of coral strings with pendants, set off on both sides by rosettes of larger beads of a different sort. Encircling the neck as high as the lower lips are thirty-one coral ropes, forming the collar, which is the insignia of a high dignitary.

On the face may be observed his tribal marks, consisting of three raised weals over the outer corners of each eye, and of two long perpendicular lines running down the front of the forehead above each inner corner. These last probably represented ordinary tattoo marks on the brow, as they are represented by bands of iron, ingeniously let into the metal during the casting. In the same way the pupils of the eye are formed by round discs of iron. The whole figure has been very carefully chiselled over; and when it was newly finished, there is little doubt that the steel-blue tattoo lines and the glistening pupils gave to the face and eyes a very life-like appearance.

The projecting circular flange of the base has depicted

on it a series of most interesting symbolic and fetish emblems. From its centre in front, the different symbols follow each other in the same order round both halves of the circumference. The central symbol is a bullock's head; then, in succession, a stone neolithic celt; an arm excised at the shoulder (with a tripod-like ornament covering the termination, and in its hand a three-pointed object); a frog; a fish, with protruding eyes, which seems to resemble more nearly than any other the curious mud-hopping *Periophthalmus koelreuteri*, so common on the brackish margins of West African rivers, or, possibly, it may be intended for—though very unlike—the electric fish (*Malapterurus*), which is a powerful fetish on different parts of the coast, because of the "quaking and trembling it produces in the arm"; then follows another bullock's head, which, with a second neolithic stone axe, completes the series.

The bullock's head, which occupies the central position among the symbols, is doubtless a fetish emblem. The



FIG. 1.

Beni have large herds of black and white cattle, as described by Burton; and bullocks form one of the chief sacrifices, human beings being the other, when the king is making "country custom" for his father and dead ancestors. The same emblem was much in evidence also in Dahomey, when, "during the customs," as Commander Forbes records, "a party carrying the fetish gear is headed by a man in a huge coat of dry grass, wearing a large bullock's head. As he passes, all the boys follow crying 'Soh, soh!' This is the representative of the god of thunder and lightning." One of these actual masks formed part of the Benin loot, and is now in the National Collection.

The next emblem to this, on each side, is the representation of an undoubted neolithic celt. These implements, which occur in the ground in many parts of Africa, are, among the Yorubas, considered to be "thunderbolts which Shango or Jakuta, the thunder god,

cast down from heaven, and are venerated as sacred relics. Among the negroes in Tobago, in the West Indies, where they disinter similar neolithic axes, from time to time, in digging holes for sugar-canes, the stone is often boiled, and the water drunk to cure various kinds of ailments. The tusk-holders that have been secured for the Liverpool Museum must be of great antiquity, for they are overlaid with a very rich patina, the result of long exposure.

The little statuette (Fig. 3) is very interesting. It represents a native soldier or hunter, standing with a flint-lock in his hand. The upper part of his body is clothed in a garment ingeniously made of the two halves of a headless leopard's hide. A short pleated kilt-like garment encircles his loins. He wears a bandolier, a short sword, a hunting-knife, and a powder-flask made



FIG. 2.

of elephant tusk. The most interesting detail of this statuette is undoubtedly the flint-lock, as it serves to fix the period anterior to which this casting could not have been made, *i.e.* 1630 to 1640, the date of the invention of flint-locks.

The elaborate details on the plaques, statuettes and tusk-holders prove that whoever the artist was who designed these objects, he was, or had become, well acquainted with the religious or fetish feelings and ideas of the people, their ceremonies and customs, and with the minutest details of their various garments, ornaments and accoutrements, and was no passing visitor. His skill and patience are beyond question.

The material of which these various objects is composed is not bronze, as has been generally stated in most



of the accounts of them, but a copper-lead-zinc compound, in which the proportions of the three elements vary very much. Its analysis has consequently thrown little light on the source whence the metal was obtained.

The process of manufacture was undoubtedly that known as *Cera perduta*, in which the object is first modelled in very fusible wax. The model is then overlaid with finely levigated clay, and built up to a sufficient thickness. Through an orifice, afterwards made in the clay, the wax is melted out, and the molten metal run into the vacuity. By this process each article requires a model for itself, and only one casting can be made from one mould.



FIG. 3.

As the present natives of Benin are incapable of producing, at the present day, any works approaching these plaques and statuettes, it may be that the art was brought to the West Coast Hinterland by some European trader, prisoner or resident, who, observing the skill of these people in the modelling of clay figures, such as the Fantee women fashion, may have instructed them how to do the same in wax, and how by overlaying the model with clay to finally reproduce it in metal.

It is possible, on the other hand, that their knowledge of founding was derived from purely African sources. The ancient Egyptians knew how to cast in bronze, in which there was, however, no zinc. The Benin upper

classes are not negroid, their features are regular, and their skin olive-coloured. It seems not improbable, therefore, as another explanation of the presence of such high works of art in Benin, that many centuries ago the city may have been occupied by an offshoot of the same central Soudan race, with the leaven of Abyssinian or Egyptian influences among them, as now occupies Nupe, a few hundred miles further north; but that through intercourse with the debased coast tribes, they became demoralised and degenerated into their present low civilisation. The metal work discovered in the city may, therefore, be the relics of a former higher civilisation; or they may, as Commander Bacon has suggested, have been the spoils of some campaign, kept as fetiches. When, however, their full history is elucidated, an interesting and unsuspected chapter in the history of West Africa will undoubtedly be brought to light.

#### THE PROPOSED UNIVERSITY FOR BIRMINGHAM.

THE movement started in Birmingham fifteen years ago for the establishment of a University in the Midlands has been growing so steadily in energy and in volume that the promoters feel justified in taking definite steps for the accomplishment of their object. The first stage of operations was reached last year, when the College founded by Sir Josiah Mason in 1880 was incorporated by Act of Parliament under a new constitution, and received the new name of "Mason University College." An important step forward was taken last week, July 4, when the first public meeting in favour of the proposal to create a University was held in the Council House, under the chairmanship of the Lord Mayor of Birmingham, and was attended by Mr. Joseph Chamberlain, M.P., and an influential gathering. The proceedings must have been in the highest degree satisfactory to the promoters, for not only were some interesting speeches delivered and much enthusiasm displayed, but a very substantial proof of the earnestness with which the scheme is being taken up by the inhabitants was afforded by the announcement of promised donations to the requisite funds of about 96,000*l.* The next step will be the issue of a public appeal for further donations; and it is confidently expected that the sum of 250,000*l.*, which it is estimated is necessary to complete the equipment of the College, to found new chairs, to supply additional buildings, and to provide for the administrative machinery of the University, will before long be subscribed.

The proceedings at the recent meeting included the resolution, "That in the opinion of this meeting it is essential that in the interest of the city and the Midland district generally, a University shall be forthwith established in Birmingham." Mr. G. H. Kenrick, who moved this resolution, is a manufacturer at West Bromwich, employing a large number of men; and is himself a donor of 10,000*l.* to the fund. He has for many years taken a prominent and honourable part in promoting elementary and technical education in the city; and his opinion on such a question, whether as a man of business or as a school manager, is entitled to respectful attention from his fellow citizens. After referring to the influence which the existence of the University would have upon the training and education of teachers, Mr. Kenrick went on to give his view as to the intimate relation which must be established between the University and the industries of the district; and it is to be hoped that both parties, the professors on the one hand and manufacturers on the other, will be careful to note the very sensible observations of the speaker upon this topic.

No man can now stand up and say that industry can get on very well without science. That idea has been almost given up, but a more dangerous one has arisen in its place.