

health, and creative energy (Schliemann's "Ilios," p. 348). Mr. Edward Thomas (*ibid.*) believes it to have arisen from the conception of the sun as a rolling wheel. The Chaldean sun symbol was first a circle, then a circle with an inscribed cross. The symbol of the sun-god at Sippara is a small circle with four triangular rays, the four angles between being occupied by radiating lines, and the whole circumscribed by a larger circle. The same symbol occurs repeatedly upon the shell gorgets of the mound-builders (Second Annual Report of the U.S. Bureau of Ethnology, plates liii., lviii., and lix.). The peculiar figure repeated upon the *façade* of the "House of the Nuns" at Uxmal seems to be a conventionalised circle and cross with rays. The Moqui symbol for the sun is a Greek cross with a small circle at the centre, in which are three marks to indicate the eyes and mouth of a face (First Annual Report of the U.S. Bureau of Ethnology, p. 371). It is needless to multiply examples: the important question is, How has the cross come to be a symbol of the sun? If anyone will observe carefully a lamp, or other bright light, with partially closed eyes, the answer will be obvious. The rays which appear to proceed from the luminous point always form a cross of some kind. A little experimenting will show that this appearance is due to reflection from the eyelashes and edges of the eyelids. The same experiment may be tried with the sun itself: if observed when considerably above the horizon, squinting will be unavoidable. If the head is erect, the downward arm of the cross will be much the strongest, and the upward arm may be obsolete; but if the head is thrown back, the arms will be nearly equal. The evolution of the sun symbol seems to have been as follows: He was first represented by a circle or disk as he appears when near the horizon; observations made when he was shining brightly revealed the crossed rays. This led to a combination of the circle and cross. If this hypothesis be correct, the *svastika* was originally neither a rolling wheel, nor, as Burnouf supposes, the crossed sticks from which our ancestors elicited fire; but it is a modification of the circle and inscribed cross.

It is not claimed that the cross has in every case originated in this way; but since sun-worship is known to have been an almost universal form of primitive religion, and since the unscientific observer would be sure to regard the crossed rays as an essential part of the sun, this hypothesis furnishes a reasonable explanation of the universality of the symbol. Anything bearing the cross would be regarded as sacred; hence the Egyptian worship of the scarab, as noticed by Mr. R. G. Haliburton (*NATURE*, vol. xxxiv. p. 610), and the spider-gorgets of the mound-builders (Second Annual Report of the U.S. Bureau of Ethnology, plate lxi.). Not the least remarkable feature of the subject is the fact that the most ancient and universal symbol of the physical sun should, for entirely independent reasons, continue in use as the sign of "the Sun of righteousness" and "the Light of the world." CHARLES R. DRYER

Fort Wayne, Ind., U.S.A., January 12

#### Clausius's Formula

IN the report of our preliminary communication to the Royal Society, reported in your issue of the 13th inst. (p. 262), we give Clausius's formula intended to express the relation between the gaseous and liquid states of matter as

$$p = \frac{RT}{v-a} - \frac{c}{T(v+\beta)^2}$$

We should have mentioned that this formula has been amended by Clausius to

$$p = \frac{RT}{v-a} - \frac{c}{\Theta(v+\beta)^2}$$

where  $\Theta = aT^{\alpha}b$ . As  $\Theta$  is a function of  $T$ , it is evident that this latest form also is not in agreement with the simple relation pointed out by us for ethyl ether,

$$p = \beta T - a.$$

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SYDNEY YOUNG

January 20

#### Notes on Certain Traits of Infant Navajos

As we know, the Navajos are an American tribe of Indians, scattered for the most part over the Territories of New Mexico and Arizona. Quite a number of them live with their families,

in the curious little habitations they erect, about the frontier military station of Fort Wingate, New Mexico. It is in this latter place that I have had the opportunity, for over two years past, of studying many of their ways and customs. And it was here, too, that, a few days ago, I went out among them with a photographic camera, armed with an English instantaneous shutter, with the view of taking a few pictures of them while they were actively engaged in some of their very interesting games.

After having obtained four or five more or less satisfactory plates, the Indians became quite restive, as they rather object to that sort of a thing; and, as if by common consent, they gradually disappeared, a few at a time making for one of their low, conical-shaped mud huts, where they entered through the single small door at its side. In less than half an hour there were none of them to be seen outside at all, and, knowing full well that they would not appear again so long as I remained upon the ground, I shouldered my instrument and prepared to come away. At the time, I was standing between two of their huts, situated some three hundred yards apart, with a well-beaten, though narrow footpath passing from one to the other. There were no trees within a quarter of a mile, the plain being sparsely covered with sage-brush, the plants being from 2 to 3 feet high. Just then one of their babies toddled out of the doorway of the upper hut; the child could not have been over ten months old, and wore only a very dirty little shirt, which came about half way down to its knees. It looked more like an infant Eskimo than any child, not white, that I know anything about; and it started right down the path with a very unsteady baby-waddle, making for the lower hut, where I imagine its mother had taken refuge from my merciless camera. I had often longed for a good picture of a Navajo baby in its native plains, and here was an opportunity not to be lost. So, stepping a few feet out of the way, in an instant I had my instrument in position, focused on the path, and, with instantaneous snap ready, I stood quietly for my subject to pass. On he toddled, until he came within about 30 feet of me, where he suddenly stopped, and, to my surprise, seemed to fully take in the situation.

At this stage, I feel quite sure that one of our babies, especially at this tender age, would have begun to cry, and more than likely retraced its steps to the hut from whence it had issued. Not so, however, this infant Navajo; and, mark the difference. He steadily watched my every movement, and was evidently determined to reach the lower hut. Very cautiously leaving the path on the side furthest from me, he was, in the next instant, behind one of the sage-brushes, which was something over a foot taller than the baby. From this position he peered through the leafless twigs at me, to see what I would do about it. A little annoyed at this turn in affairs, I threw the focusing-cloth over my head, and turned the instrument on him. Taking advantage of this temporary concealment of my head, he ran, thoroughly baby-fashion, to the next lower brush, a distance of some 10 feet, where, hiding as before, he crouched down, and stared at me like a young lynx through the twigs. He now looked, for all the world, the young Indian cub at bay, with all the native instincts of his ancestors on the alert, and making use of all the strategy his baby mind could muster. It was a wonderfully interesting picture to study; but, fearing that I would lose a permanent memento of it, I turned to lift my instrument, with the view of taking a much nearer position, when, again facing the brush where I had last seen the baby, it was, to my great surprise, not there, but had scampered to the next lower one, in the direction of the hut for which it was bound. A full-grown buck of the tribe could not have possibly managed this last movement any better. As it ran to the still next lower brush, I was astonished beyond measure (for, I take it, I am a good stalker myself) how it took advantage of everything that lay in the short intervening distance, and how, after it arrived at the brush, it immediately took a position on the opposite side of it, from where it could make another quick start, and yet not lose sight of my movements. And, mind you, all this from a baby only ten months old at the most. As it was rapidly gaining its point and approaching the lower hut, in sheer desperation I ran up on its last place of concealment, holding my camera in such a way that I could immediately place the tripod in position, which I succeeded in doing, with the lens levelled directly at its head, and not 3 feet from it. It now stood up to the full extent of its baby height, and, giving vent to a genuine infantile bawl, it made a break for the final point of its destination, for there