nevertheless, that there is a small volvula which lies, as in *Lepidosteus*, in the posterior part of the optic ventricle.

One curious result of the development of a volvula is the peculiar course by which the fourth cranial nerve reaches its centre. Entering at the usual place in the valve, it has to traverse a large part of the volvula before making its exit from the brain.

In the drum (*Haplodonotus*) the brain as a whole is exceedingly short. This shortening has the effect to tilt the optic lobes and cerebellum at a considerable angle with the axis of the brain, and to roll the volvula into a spherical mass with three folds, which are packed closely into the cavity of the ventricle. The main lobe of the cerebellum also has a short cephalad spur.

In the cat-fish family the cerebellum, instead of projecting backward, is thrust cephalad, affording a very good and constant differential character. The few illustrations here cited are derived from a memoir about to appear in the *Journal of Comparative Neurology*, where a wider range of comparison and full illustration may be possible.

It will be noticed that in the above cases the gray or granular material is ental. It has been shown by Professor His that the nervous elements in the spinal cord and medulla arise from the ventricular epithelium. This the writer has show is also the case in the cerebellum, at least in reptiles and fishes. In the massive cerebellum of mammals we are struck by the difficulty which stands in the way of the carrying out of the same fundamental plan of structure. The active cells are separated from the epithelium by impervious masses of fibres. How, then, do these cells reach their destination? This important question we at first sought to solve by discovering in some embryonic stage an eversion similar to that described in reptiles. This proved to be a valuable clew, but not actually correct, though a tendency to revolve from behind forward is very pronounced in the cerebellum of birds, and is exhibited in the direction of the lobules of the cerebellum in marsupials. But, while there is not an actual eversion of the cerebellum in mammals, there is a time when a pouch from the lateral posterior walls of the fourth ventricle is formed. This divertacle envelops the cerebellum and meets its fellow of the opposite side. In a short time this sac flattens out, and both layers fuse with the ectal surface of the cerebellum, and constitute a temporary proliferating organ from which the cells are derived. These cells migrate to a point beneath the layer of Purkinje's cells, the origin of which seems to be also from the ventricular epithelium. Although this process has been observed only in rodentia there can be no doubt that it prevails in other groups of mammals. Although somewhat unexpected, this method is not unlike that which Professor His has described for the origin of the olives and related structures of the medulla. By this provision the increase of ectal surface through the convolutions of the cerebellum provides for the largest possible enlargement of the active centres with the most economical distribution of fibres.

This discovery may serve to enforce the value of a comparative method in approaching a complicated problem like the present one.

C. L. HERRICK.

JOHN GILMER SPEED follows up his article in the September *Lippincott's* with a paper entitled "The Common Roads of Europe." He shows how far ahead of us the great nations of Europe are in the matter of roads and their administration and maintenance. Among other articles in the October number may be mentioned a paper by William Agnew Paton upon "The Lost 'Landfall' of Columbus."

ANTHROPOLOGY PAST AND PRESENT.[1]

[Continued from p. 172.]

IT has been the custom to speak of the early Aryan, Semitic, and Turanian races as large swarms — as millions pouring from one country into another. It has been calculated that these early nomads would have required immense tracts of meadow land to keep their flocks, and that it was the search for new pastures that drove them, by an irresistible force, over the whole inhabitable earth.

This may have been so, but it may also have not been so. Anyhow, we have a right to suppose that, before there were millions of human beings, there were at first a few only. We have been told of late that there never was a first man; but we may be allowed to suppose, at all events, that there were at one time a few first men and a few first women. If, then, the mixture of blood by marriage and the mixture of language in peace or war took place at an early time, when the world was peopled by some individuals, or by some hundreds, or by some thousands only, think what the necessary result would have been. It has been calculated that it would only require six hundred years to populate the whole earth with the descendants of one couple, the first father being dolichocephalic and the first mother brachycephalic. They might, after a time, all choose to speak the Aryan language, but they could not choose their skulls, but would have to accept them from nature, whether dolichocephalic or brachycephalic.

Who, then, would dare at present to lift up a skull and say this skull must have spoken an Aryan language, or lift up a language and say this language must have been spoken by a dolichocephalic skull? Yet, though no serious student would any longer listen to such arguments, it takes a long time before theories that were maintained for a time by serious students, and were then surrendered by them, can be completely eradicated. I shall not touch to-day on the hackneyed question of the "home of the Aryans" except as a warning. There are two quite distinct questions concerning the home of the Aryans.

When students of philology speak of Aryans, they mean by Aryas nothing but people speaking an Aryan language. They affirm nothing about skulls, skins, hair, and all the rest. Arya with them means speakers of an Aryan language. While, on the contrary, students of physiology speak of dolichocephalic, orthognathic, euthycomic people, they speak of their physiological characteristics only, and affirm nothing whatever about language.

It is clear, therefore, that the home of the Aryas, in the proper sense of that word, can be determined by linguistic evidence only, while the home of a blue-eyed, blond-haired, long-skulled, fair-skinned people can be determined by physiological evidence only. Any kind of concession or compromise on either side is simply fatal, and has led to nothing but a promiscuous slaughter of innocents. Separate the two armies, and the whole physiological evidence collected by D'Omalius, D'Halloy, Latham, and their followers will not fill more than an octavo page; while the linguistic evidence collected by Benfey and his followers will not amount to more than a few words. Everything else is mere rhetoric.

The physiologist is grateful, no doubt, for any additional skull whose historical antecedents can be firmly established; the philologist is grateful for any additional word that can help to indicate the historical or geographical whereabouts of the unknown speakers of Aryan speech. On these points it is possible to argue. They alone have a really scientific value in the eyes of a scholar, because, if there is any difference of opinion on them, it is possible to come to an agreement. As soon, however, as we go beyond these mere matters of fact, which have been collected by real students, everything becomes at once mere vanity and vexation of spirit. I know the appeals that have been made for concessions and some kind of compromise between physiology and philology; but honest students know that on scientific subjects no compromise is admissible. With regard to the home of the Aryas, no honest philologist will allow himself to be driven one step beyond the statement that the unknown people who spoke Aryan languages were, at one time,

[1] Address before the section of Anthropology of the British Association for the Advancement of Science, at Cardiff, August, 1891, by Professor F. Max Müller, president of the section (Nature, Sept. 3).

and before their final separation, settled somewhere in Asia. That may seem very small comfort, but for the present it is all that we have a right to say. Even this must be taken with the limitations which, as all true scholars know, apply to speculations concerning what may have happened, say, five thousand or ten thousand years ago. As to the color of the skin, the hair, the eyes, of those unknown speakers of Aryan speech, the scholar says nothing; and when he speaks of their blood he knows that such a word can be taken in a metaphorical sense only. If we once step from the narrow domain of science into the vast wilderness of mere assertion, then it does not matter what we say. We may say, with Penka, that all Aryas are dolichocephalic, blue-eyed, and blond, or we may say, with Piétrement, that all Aryas are brachycephalic, with brown eyes and black hair (V. d.Gheyn, 1889, p. 26). There is no difference between the two assertions. They are both perfectly unmeaning. They are *vox et prœterea nihil.*

My experiences during the last forty years have only served to confirm the opinion which I expressed forty years ago, that there ought to be a complete separation between philology and physiology. And yet, if I were asked whether such a divorce should now be made absolute, I should say, No. There have been so many unexpected discoveries of new facts, and so many surprising combinations of old facts, that we must always be prepared to hear some new evidence, if only that evidence is brought forward according to the rules which govern the court of true science. It may be that in time the classification of skulls, hair, eyes, and skin may be brought into harmony with the classification of language. We may even go so far as to admit, as a postulate, that the two must have run parallel, at least in the beginning of all things. But with the evidence before us at present, mere wrangling, mere iteration of exploded assertions, mere contradictions, will produce no effect on the true jury, which hardly ever consists of more than twelve trusty men, but with whom the final verdict rests. The very things that most catch the popular ear will by them be ruled out of court. But every single new word, common to all the Aryan languages and telling of some climatic, geographical, historical, or physiological circumstance in the earliest life of the speakers of Aryan speech, will be truly welcome to philologists quite as much as a skull from an early geological stratum is to the physiologist, and both to the anthropologist, in the widest sense of that name.

But, if all this is so, if the alliance between philology and physiology has hitherto done nothing but mischief, what right, it may be asked, had I to accept the honor of presiding over this section of anthropology? If you will allow me to occupy your valuable time a little longer, I shall explain, as shortly as possible, why I thought that I, as a philologist, might do some small amount of good as president of the Anthropological Section.

In spite of all that I have said against the unholy alliance between physiology and philology, I have felt for years —and I believe I am now supported in my opinion by all competent anthropologists—that a knowledge of languages must be considered in future as a *sine quâ non* for every anthropologist.

Anthropology, as you know, has increased so rapidly that it seems to say now, "*Nihil humani a me alienum puto.*" So long as anthropology treated only of the anatomy of the human body, any surgeon might have become an excellent anthropologist. But now, when anthropology includes the study of the earliest thoughts of man, his customs, his laws, his traditions, his legends, his religions, ay, even his early philosophies, a student of anthropology without an accurate knowledge of languages, without the conscience of a scholar, is like a sailor without a compass.

No one disputes this with regard to nations who possess a literature. No one would listen to a man describing the peculiarities of the Greek, the Roman, the Jew, the Arab, the Chinese, without knowing their languages, and being capable of reading the masterworks of their literature. We know how often men who have devoted the whole of their life to the study, for instance, of Hebrew, differ, not only as to the meaning of certain words and passages, but as to the very character of the Jews. One authority states that the Jews, and not only the Jews, but all Semitic nations, were possessed of a monotheistic instinct. Another authority shows that all Semitic nations, not excluding the Jews, were polytheistic in their religion, and that the Jehovah of the Jews was not conceived at first as the Supreme Deity, but as a national god only, as the God of the Jews, who, according to the latest view, was originally a fetish or a totem, like all other Gods.

You know how widely classical scholars differ on the character of Greeks and Romans, on the meaning of their customs, the purpose of their religious ceremonies —nay, the very essence of their gods. And yet there was a time, not very long ago, when anthropologists would rely on the descriptions of casual travellers, who, after spending a few weeks, or even a few years, among tribes whose language was utterly unknown to them, gave the most marvellous accounts of their customs, their laws, and even their religion. It may be said that anybody can describe what he sees, even though unable to converse with the people. I say, decidedly no; and I am supported in this opinion by the most competent judges. Dr. Codrington, who has just published his excellent book on the "Melanesians: their Anthropology and Folk-Lore," spent twenty-four years among the Melanesians, learning their dialects, collecting their legends, and making a systematic study of their laws, customs, and superstitions. But what does he say in his preface? "I have felt the truth," he says, "of what Mr. Fison, late missionary in Fiji, has written: 'When a European has been living for two or three years among savages, he is sure to be fully convinced that he knows all about them; when he has been ten years or so amongst them, if he be an observant man, he knows that he knows very little about them, and so begins to learn.'"

How few of the books in which we trust with regard to the characteristic peculiarities of savage races have been written by men who have lived among them for ten or twenty years, and who have learnt their languages till they could speak them as well as the natives themselves.

It is no excuse to say that any traveller who has eyes to see and ears to hear can form a correct estimate of the doings and sayings of savage tribes. It is not so, and anthropologists know from sad experience that it is not so. Suppose a traveller came to a camp where he saw thousands of men and women dancing round the image of a young bull. Suppose that the dancers were all stark naked, that after a time they began to fight, and that at the end of their orgies there were three thousand corpses lying about weltering in their blood. Would not a casual traveller have described such savages as worse than the negroes of Dahomey? Yet these savages were really the Jews, the chosen people of God. The image was the golden calf, the priest was Aaron, and the chief who ordered the sacrifice was Moses. We may read the thirty-second chapter of Exodus in a very different sense. A traveller who could have conversed with Aaron and Moses might have understood the causes of the revolt and the necessity for the massacre. But without this power of interrogation and mutual explanation, no travellers, however graphic and amusing their stories may be, can be trusted; no statements of theirs can be used by the anthropologists for truly scientific purposes.

From the day when this fact was recognized by the highest authorities in anthropology, and was sanctioned by some at least of our anthropological, ethnological, and folk lore societies, a new epoch began, and philology received its right place as the handmaid of anthropology. The most important paragraph in our new charter was this, that in future no one is to be quoted or relied on as authority on the customs, traditions, and more particularly on the religious ideas of uncivilized races who has not acquired an acquaintance with their language sufficient to enable him to converse with them freely on these difficult subjects.

No one would object to this rule when we have to deal with civilized and literary nations. But the languages of Africa, America, Polynesia, and even Australia, are now being studied as formerly Greek, Latin, Hebrew, and Sanscrit only were studied. You have only to compare the promiscuous descriptions of the Hottentots in the works of the best ethnologists with the researches of a real Hottentot scholar like Dr. Hahn to see the advance that has been made. When we read the books of Bishop Callaway on the Zulu, of William Gill and Edward Tregear on the Polynesians, of Horatio Hale on some of the North American races, we feel at once that we are in safe hands, in the hands of real scholars. Even then we must, of course, remember that their knowledge of

the languages cannot compare with that of Bentley, or Hermann, or Burnouf, or Ewald. Yet we feel that we cannot go altogether wrong in trusting to their guidance.

I venture to go even a step further, and I believe the time will come when no anthropologist will venture to write on anything concerning the inner life of man without having himself acquired a knowledge of the language in which that inner life finds its truest expression.

This may seem to be exacting too much, but you have only to look, for instance, at the descriptions given of the customs, the laws, the legends, and the religious convictions of the people of India about a hundred years ago, and before Sanscrit began to be studied, and you will be amazed at the utter caricature that is often given there of the intellectual state of the Brahmans compared with what we know of it now from their own literature.

And if that is the case with a people like the Indians, who are a civilized race, possessed of an ancient literature, and well within the focus of history for the last two thousand years, what can be expected in the case of really savage races? One can hardly trust one's eyes when one sees the evidence placed before us by men whose good faith can not be questioned, and who nevertheless contradict each other flatly on the most ordinary subjects. We owe to one of our secretaries, Mr. Roth, a most careful collection of all that has been said on the Tasmanians by eye-witnesses. Not the least valuable part of this collection is that it opens our eyes to the utter untrustworthiness of the evidence on which the anthropologist has so often had to rely. In an article on Mr. Roth's book in *Nature*, I tried to show that there is not one essential feature in the religion of the Tasmanians on which different authorities have not made assertions diametrically opposed to each other. Some say that the Tasmanians have no idea of a Supreme Being, no rites or ceremonies; others call their religion Dualism, a worship of good and evil spirits. Some maintain that they had deified the powers of nature, others that they were Devil-worshippers. Some declare their religion to be pure monotheism, combined with belief in the immortality of the soul, the efficacy of prayers and charms. Nay, even the most recent article of faith — the descent of man from some kind of animal — has received a religious sanction among the Tasmanians. For Mr. Horton, who is not given to joking, tells us that they believed "they were originally formed with tails, and without knee-joints, by a benevolent being, and that another descended from heaven, and, compassionating the sufferers, cut off their tails, and with grease softened their knees."

I would undertake to show that what applies to the descriptions given us of the now extinct race of the Tasmanians applies with equal force to the descriptions of almost all the savage races with whom anthropologists have to deal. In the case of large tribes, such as the inhabitants of Australia, the contradictory evidence may, no doubt, be accounted for by the fact that the observations were made in different localities. But the chief reason is always the same — ignorance of the language, and therefore want of sympathy and impossibility of mutual explanation and correction.

Let me, in conclusion, give you one of the most flagrant instances of how a whole race can be totally misrepresented by men ignorant of their language, and how these misrepresentations are at once removed if travellers acquire a knowledge of the language, and thus have not only eyes to see, but ears to hear, tongues to speak, and hearts to feel.

No race has been so cruelly maligned for centuries as the inhabitants of the Andaman Islands. An Arab writer of the ninth century states that their complexion was frightful, their hair frizzled, their countenance and eyes terrible, their feet very large, and almost a cubit in length, and that they go quite naked. Marco Polo (about 1285) declared that the inhabitants are no better than wild beasts, and he goes on to say: "I assure you all the men of this island of Angamanain have heads like dogs, and teeth and eyes likewise; in fact, in the face they are just like big mastiff dogs."

So long as no one could be found to study their language, there was no appeal from these libels. But when, after the Sepoy mutiny in 1856, it was necessary to find a habitation for a large number of convicts, the Andaman Islands, which had already served as a penal settlement on a smaller scale, became a large penal colony under English officers. The havoc that was wrought by this sudden contact between the Andaman Islanders and these civilized Indian convicts was terrible, and the end will probably be the same as in Tasmania — the native population will die out. Fortunately one of the English officers (Mr. Edward Horace Man) did not shrink from the trouble of learning the language spoken by these islanders, and, being a careful observer and perfectly trustworthy, he has given us some accounts of the Andaman aborigines which are real masterpieces of anthropological research. If these islanders must be swept away from the face of the earth, they will now, at all events, leave a good name behind them. Even their outward appearance seems to become different in the eyes of a sympathizing observer from what it was to casual travellers. They are, no doubt, a very small race, their average height being 4 feet 10½ inches. But this is almost the only charge brought against them which Mr. Man has not been able to rebut. Their hair, he says, is fine, very closely curled, and frizzly. Their color is dark, but not absolutely black. Their features possess little of the most marked and coarser peculiarities of the negro type. The projecting jaws, the prominent thick lips, the broad and flattened nose of the genuine negro, are so softened down as scarcely to be recognized.

But let us now hear what Mr. Man has to tell us about the social, moral, and intellectual qualities of these so-called savages, who had been represented to us as cannibals; as ignorant of the existence of a deity; as knowing no marriage, except what by a bold euphemism has been called communal marriage; as unacquainted with fire; as no better than wild beasts, having heads, teeth, and eyes like dogs — being, in fact, like big mastiffs.

"Before the introduction into the islands of what is called European civilization, the inhabitants," Mr. Man writes, "lived in small villages, their dwellings built of branches and leaves of trees. They were ignorant of agriculture, and kept no poultry or domestic animals. Their pottery was hand-made, their clothing very scanty. They were expert swimmers and divers, and able to manufacture well-made dug-out canoes and outriggers. They were ignorant of metals ignorant, we are told, of producing fire, though they kept a constant supply of burning and smouldering wood. They made use of shells for their tools, had stone hammers and anvils, bows and arrows, harpoons for killing turtle and fish. Such is the fertility of the island that they have abundance and variety of food all the year round. Their food was invariably cooked, they drank nothing but water, and they did not smoke. People may call this a savage life. I know many a starving laborer who would gladly exchange the benefits of European civilization for the blessings of such savagery."

These small islanders, who have always been represented by a certain class of anthropologists as the lowest stratum of humanity, need not fear comparison, so far as their social life is concerned, with races who are called civilized. So far from being addicted to what is called by the self-contradictory name of communal marriage, Mr. Man tells us that bigamy, polygamy, polyandry, and divorce are unknown to them, and that the marriage contract, so far from being regarded as a merely temporary contract, to be set aside on account of incompatibility of temper or other such causes, is never dissolved. Conjugal fidelity till death is not the exception but the rule, and matrimonial differences, which occur but rarely, are easily settled with or without the intervention of friends. One of the most striking features of their social relations is the marked equality and affection which exist between husband and wife; and the consideration and respect with which women are treated might, with advantage, be emulated by certain classes in our own land. As to cannibalism and infanticide, they are never practised by them.

It is easy to say that Mr. Man may be prejudiced in favor of these little savages, whose language he has been at so much pains to learn. Fortunately, however, all his statements have lately been confirmed by another authority, Colonel Cadell — the chief commissioner of these islands. He is a Victoria Cross man, and not likely to be given to over much sentimentality. Well, this is what he says of these fierce mastiffs, with feet a cubit in length:

"They are merry little people," he says. "One could not im-

agine how taking they were. Everyone who had to do with them fell in love with them [these fierce mastiffs]. Contact with civilization had not improved the morality of the natives, but in their natural state they were truthful and honest, generous and self-denying. He had watched them sitting over their fires cooking their evening meal, and it was quite pleasant to notice the absence of greed and the politeness with which they picked off the tit-bits and thrust them into each other's mouths. The forest and sea abundantly supplied their wants, and it was therefore not surprising that the attempts to induce them to take to cultivation had been quite unsuccessful, highly as they appreciated the rice and Indian corn which were occasionally supplied to them. All was grist that came to their mill in the shape of food. The forest supplied them with edible roots and fruits. Bats, rats, flying foxes, iguanas, sea-snakes, mollusks, wild pig, fish, turtle, and last, though not least, the larvæ of beetles, formed welcome additions to their larder. He remembered one morning landing by chance at an encampment of theirs, under the shade of a gigantic forest tree. On one fire was the shell of a turtle, acting as its own pot, in which was simmering the green fat delicious to more educated palates; on another its flesh was being broiled, together with some splendid fish; on a third a wild pig was being roasted, its drippings falling on wild yams, and a jar of honey stood close by, all delicacies fit for an alderman's table."

These are things which we might suppose anybody who has eyes to see, and who is not wilfully blind, might have observed. But when we come to traditions, laws, and particularly to religion, no one ought to be listened to as an authority who cannot converse with the natives. For a long time the Mincopies have been represented as without any religion, without even an idea of the Godhead. This opinion received the support of Sir John Lubbock, and has been often repeated without ever having been re-examined. As soon, however, as these Mincopies began to be studied more carefully, — more particularly as soon as some persons resident among them had acquired a knowledge of their language, and thereby a means of real communication, — their religion came out as clear as daylight. According to Mr. E. H. Man, they have a name for God — *Pûluga*. And how can a race be said to be without a knowledge of God if they have a name for God? Pûluga has a very mythological character. He has a stone house in the sky; he has a wife, whom he created himself, and from whom he has a large family, all except the eldest being girls. The mother is supposed to be green (the earth?), the daughters black; they are the spirits, called *Môrowin;* his son is called *Pûjchor*. He alone is permitted to live with his father, and to convey his orders to the Môrowin. But Pûluga was a moral character also. His appearance is like fire, though nowadays he has become invisible. He was never born, and is immortal. The whole world was created by him, except only the powers of evil. He is omniscient, knowing even the thoughts of the heart. He is angered by the commission of certain sins, — some very trivial, at least to our mind, — but he is pitiful to all who are in distress. He is the judge from whom each soul receives its sentence after death.

According to other authorities, some Andamanese look on the sun as the fountain of all that is good, the moon as a minor power; and they believe in a number of inferior spirits, — the spirits of the forest, the water, and the mountain, — as agents of the two higher powers. They believe in an evil spirit also, who seems to have been originally the spirit of the storm. Him they try to pacify by songs, or to frighten away with their arrows.

I suppose I need say no more to show how indispensable a study of language is to every student of anthropology. If anthropology is to maintain its high position as a real science, its alliance with linguistic studies cannot be too close. Its weakest points have always been those where it trusted to the statements of authorities ignorant of language and of the science of language. Its greatest triumphs have been achieved by men such as Dr. Hahn, Bishops Callaway and Colenso, Dr. W. Gill, and last, not least, Mr. Man, who have combined the minute accuracy of the scholar with the comprehensive grasp of the anthropologist, and were thus enabled to use the key of language to unlock the perplexities of savage customs, savage laws and legends, and, particularly, of savage religions and mythologies. If this alliance between anthropology and philology becomes real, then, and then only, may we hope to see Bunsen's prophecy fulfilled, that anthropology will become the highest branch of the science for which this British Association is instituted.

Allow me in conclusion once more to quote some prophetic words from the address which Bunsen delivered before our section in 1847:

"If man is the apex of the creation, it seems right, on the one side, that a historical inquiry into its origin and development should never be allowed to sever itself from the general body of natural science, and in particular from physiology. But, on the other side, if man is the apex of the creation, if he is the end to which all organic formations tend from the very beginning, if man is at once the mystery and the key of natural science, if that is the only view of natural science worthy of our age, then ethnological philology (I should prefer to say anthropology), once established on principles as clear as the physiological are, is the highest branch of that science for the advancement of which this association is instituted. It is not an appendix to physiology or to anything else; but its object is, on the contrary, capable of becoming the end and goal of the labors and transactions of a scientific association."

Much has been achieved by anthropology to justify these hopes and fulfil the prophecies of my old friend Bunsen. Few men live to see the fulfilment of their own prophecies, but they leave disciples whose duty it is to keep their memory alive, and thus to preserve that vital continuity of human knowledge which alone enables us to see in the advancement of all science the historical evolution of eternal truth.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

Communication with Other Planets.

I NOTICE a letter from Sir Robert Ball with reference to the recent bequest of a French lady of 20,000 francs for a method of signalling to other planets. He enumerates different methods, but he does not speak of one method which I have never seen discussed but which seems to me worthy of mention. On a moonless clear night the electric and gas lights over such a large territory as New York and its suburbs must present the appearance to a spectator in Mars of a spot of light on the dark side of our globe If, now, on such a night, from the middle of some large dark area, for example, the Atlantic Ocean, brilliant flashes of light be regularly sent forth in certain forms, there would be a chance of its being interpreted by the inhabitants of other spheres, and they might thereby be induced to signal us in return.

But there is a bare possibility of direct communication by taking advantage of the meteor currents in the great ocean of space in which we move. If on breaking open a meteorite we should find a chipped flint or other instrument, we should conclude that the portion of space from which it came had intelligent inhabitants. If, now, we can by the aid of modern explosives project into some meteor shoal a ball of iron containing at its center some object of human design, the ball might ultimately come to some other planet and be found by its inhabitants. Such a procedure would be analogous to casting a bottle inclosing a message upon the ocean to be wafted by the currents to some intelligent eye.

The wild schemes of one generation are often achieved in the next. Jules Verne's "Around the World in Eighty Days" and "Twenty Thousand Leagues under the Sea" have been in a measure realized, and possibly his "Voyage to the Moon" is the next romance to be realized in some form. An initial velocity of seven miles a second would be required to project a body beyond the earth's attraction, and it is not too much to hope that this will soon be attainable at the present rate of progress in the science of explosives. A projectile sent from the earth would have considerable value as a direct astronomical experiment on meteorites, even if it should fail in bringing tidings from another planet.

HIRAM M. STANLEY.

Lake Forest, Ill., Sept. 26.