pressing through a break circuit clock moves the occulting bar every second in such a way that the image of the star is for the instant allowed to form on the photographic plate behind this bar. The impression left by the star in transit is a row of dots, which are afterwards developed in the usual way. These dots are referred to the collimation axis of the telescope by means of a glass reticule plate, ruled with one vertical line. This plate is permanently fixed in the tube, directly in front of the sensitized surface, and touching it. After the star transit is over, the light from a lantern is allowed for a few seconds to fall upon the photographic plate, which gives an impression of this reference line. The row of dots which have just been photographed can not be "fogged" by this light, as they are shielded behind the occulting bar. After the plates are developed they are measured by the aid of a micrometer.

In the *Monthly Notices of the Royal Astronomical Society* (LI., No. 9), Professor Barnard of the Lick Observatory gives the result of his observation of Jupiter and his satellites during the year 1890, made with the 12-inch equatorial. One of the most interesting points in his paper is the fact that he saw the first satellite elongated in a direction nearly perpendicular to the belts of Jupiter. This observation was made on Sept. 8, 1890, when both Mr. Barnard and Mr. Burnham saw the satellite distinctly double. The distance between the two images was about 1″, and at a position angle of 173°. Mr. Barnard gives two drawings, which represent the object as it appeared on two different dates. Two explanations are suggested. The first is that the satellite at the time of observation was crossed by a white belt parallel to those on Jupiter, or, second, that the satellite is actually double. We are strongly of the opinion that Mr. Barnard has solved his problem in his first assumption. This is explained in an article written subsequent to the one from which we have quoted. His assumption is that the satellite is crossed by a white belt, the remaining portion of the disk being dark. Now, should an object of this character transit a bright portion of Jupiter's surface, we would have the effect of two small, dark disks close together, which would appear round on account of irradiation and glare from such a bright object as the large planet. As the little moon passed across the face of Jupiter, the bright belt on the former would be lost in the bright surface of the latter. Now, if the satellite were to transit a dark portion of Jupiter's surface, we would have the opposite effect, that is, a white spot elongated in a direction parallel to the dark portion of Jupiter's surface on the large planet. Mr. Barnard, in the early fall, has reobserved these phenomena, and has found both of the conditions above mentioned fulfilled. However, these observations are very interesting, and only go to show that some of our large telescopes can be put to a good use in determining the markings on the satellites surrounding Jupiter, and assist in determining their period of rotation.

The following are the positions for comet Tempel-Swift. They are given for Paris midnight.

Date.	R. A.			Dec.	
	h.	m.	s.	°	′
Nov. 23	22	52	41	+17	22
25	23	4	6	18	27
27		16	9	19	30
29		28	48	20	33
Dec. 1	23	42	1	+21	34

The comet will reach its maximum degree of brightness on Nov. 23.

The following are the positions for Wolf's comet. They are given for Greenwich midnight.

Date.	R. A.			Dec.	
	h.	m.	s.	°	′
Nov. 18	4	32	53	−9	58
20		31	35	10	38
22		30	16	11	14
24		28	55	11	47
26		27	35	12	19
28		26	15	12	46
30	4	24	57	−13	11

The comet has now reached its nearest approach to the earth.

G. A. H.

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.

The editor will be glad to publish any queries consonant with the character of the journal.

The Man of the Future.

IN his criticism of my contribution to *Science* (Oct. 16) entitled "The Man of the Future," which was called forth by a former letter from Dr. Langdon (No. 452), Mr. Snell has expressed his views on the subject with great fulness and clarity (*Science*, Nov. 6). In several instances, however, the present writer can in no way agree with him, and as those points of disagreement are of prime importance, they will be briefly dwelt upon here. When Mr. Snell says that "The problem of human progress seems to have a fivefold aspect, physical, material, social, moral, and intellectual; and it therefore involves questions belonging to sciences as widely divergent as physiology, technology, sociology, and psychology" (p. 259), we must believe that biologists, as a rule, will not be fully in accord with him in the statement. Granting for the nonce that human progress has such a fivefold aspect, surely the consideration of his "physical" progress falls within the science of morphology rather than that of "physiology"; the "material" progress of man is quite secondary to the question at issue, and it hardly seems to be encompassed by the restricted science of "technology"; finally, strictly speaking, "psychology" is but a department of physiology, as sociology is of biology, and consequently both those sciences properly fall within the province of biology for treatment. Every biologist being more or less familiar with the factors in operation in the premises, we take it that the main object of the present discussion has to do more with a speculation upon the probable morphology of the man of the future, rather than it has to do with a discussion of the aforesaid factors, though undoubtedly in some instances it will be desirable to make somewhat extended reference to them.

As Mr. Snell remarks, he has not far to seek to find excellent authority to support his statement that "Although in the subhuman state the environment may have made the man, in the human state the man, generally speaking, makes his environment." But surely if this factor be in operation at all, which I do not fully deny, it is purely an exceptional one, and by no means the rule. In our estimation, it has been very much overrated by biologists. Take, for example, the ferine tribes the world over,—in what way do the majority of them "make their environment" any more than do the individuals in a community of beavers? Many tribes, apart from the mere possession of speech, pass an existence quite comparable with the lives led by some of the lower mammals in a state of nature. Coming up to the so-called semi-civilized races of the earth, the same principle in the main still holds true, although operative upon a somewhat higher plane. One may as well assert that the average Turk "makes his environment," and we may ask in what particular? If it be that he makes it, I, for one, should like to see the experiment of his attempting to step out of it. He probably would feel very much as the monkey does on the hand-organ or in the menagerie. Even in a highly civilized nation like our own, few there be indeed who really

understand what organic evolution means, much less to bring its laws into operation in an intelligent manner, so as to shape their own environment thereby, to the end that they keep upon the sole narrow track of true human progress. Improvement in education and its methods; improvement in human sanitation,— wear to me more and more the aspect of kinds of growths which man no more possesses the power of checking than he possesses the ability to stay the extinction of animals in nature, or even to arrest biologic evolution its very self.

The lesson taught us by the half-tried experiment in human stirpiculture by the Oneida Community was not, or rather should not be, entirely thrown away, nor do I believe that that experiment proved to be altogether a failure. To test its worth as a mode of race improvement it should be tried upon a much larger scale, in the fuller light of our more advanced scientific knowledge, and with the element of artificial selection not left out.

On the other hand, I cannot agree with our distinguished savant Professor Joseph Le Conte when he says that "if we are to have any race-improvement at all, the dreadful law of destruction of the weak and helpless must, with Spartan firmness, be carried out voluntarily and deliberately" (*The Monist*, vol. i., No. 3, Apr., 1891, p. 334); for I believe that it requires but a rigid enforcement of a law that will prevent the marrying of such individuals or their reproducing their kind at all, to soon bring about the desired result. While civilized man may be "making his own environment," he certainly is not taking any rational steps at present to improve the race in that direction,— one of the most important of all. In ages to come I have an idea that such matters will be scientifically dealt with, and they were in my mind when I discussed the "man of the future" in my letter to *Science*, whereas Mr. Snell was surely dealing with the man of the present when he remarked upon this aspect of the case, that "the plan is fraught with collateral difficulties, and, even if these could be overcome, it seems to be forever out of the question, on account of the moral impossibility of obtaining for it, under any conceivable circumstances, the sanction of public opinion" (p. 259). And, assuredly with the man of the past when, in taking exception to my prediction of the abolition of war, he makes the somewhat isolated statement that "Chateaubriand, in his pamphlet 'De Bonaparte et des Bourbons,' calculated that more lives had been lost during the Napoleonic wars than during the whole of the Middle Ages throughout all Christendom."

That long and destructive wars are gradually becoming less and less frequent seems to me to be but a matter of comparative history. National differences are now often adjusted without resort to bloodshed, which only a century or more ago would most certainly have given rise to a resort to arms. In short, warism and all that pertains to it is a relic of savagery, and with savagery must, in time, disappear.

The realization of this prediction, taken in connection with the disappearance of widespread and fatal epidemics of disease, which are likewise becoming less and less frequent, must of necessity have a powerful influence on the man of the future. By their elimination the world will certainly be more thickly and more quickly peopled with the human species. Mr. Snell has said nothing in his communication that has had a tendency to alter my opinion in reference to the destruction of the world's fauna and much of its present flora. I cannot conceive that "any portion of the flora or fauna of the globe which has even a picturesque or decorative value" as now existing, is destined to be seen by the "man of the future," and alone represents the share which is not doomed to be destroyed. Possibly your correspondent would have me believe that some time in the future the day will arrive when all the habitable part of the globe will have been converted into one continuous, immense park, combined with biological preserves and enormous areas of dwellings and other habitations for the men of the future! It depends very much what is meant by the expression "picturesque or decorative value," for to my mind biologic, and in face of the geological history of the world as now known to us, such an outcome is simply out of the question. To me, for example, there is no doubt but that the present existing avifauna of the world, or rather the entire group of those now highly specialized forms we call birds, are destined to become utterly extinct in nature in the future history of the earth, and yet they certainly possess a certain "decorative value." The largest or larger forms will first disappear, to be followed gradually by all those of less and lesser size. Our own avifauna is amply illustrative of this fact.

My critic said much in the leading paragraphs of his long communication that pleased me greatly; I refer especially to his remarks upon the growth of education; upon questions ethical and metaphysical; upon problems social and psychological, and upon morals; but I confess to my utter disappointment when I came to read further along in his article that he entertained such notions as "neither our senses nor our memories are as acute as those of our barbarian ancestors; our taste and capacity for intellectual speculation is not as great as was possessed by our predecessors of the scholastic period, or by the South Asiatic Aryans of any historic time;" and finally the statement, so tinctured with pessimism, that "the low vice of avarice rules the day." Were these statements true for the present hour, there could hardly be any doubt as to what some of the characteristics of the man of the future must be.

Mr. Snell unconditionally surrenders both sword and pen when he concludes by saying, "I cannot venture, in view of the complexity of the problem, to hazard a prediction even for the next stages of human evolution, to say nothing of the millions of years over which Dr. Shufeldt so gaily gambols." Why, human "evolution" is the very pith of the question we are considering, and we biologists believe that we have so far solved the riddle of the origin of life upon earth, and the growth and development of animal and vegetable forms since, and the laws that control the same, that it is quite a pardonable thing for us to do, even if it be of "doubtful utility," to forecast the fate of any vertebrated animal, man not excepted, into the future. A nineteenth century biologist, such as I am, is not likely to take umbrage at being charged with "gambolling over millions of years," for I am become already callous to the charge of "gambolling" too many millions of years in the other direction, or into the *past*, in seeking into the question of the *origin of man* there. Indeed, I take no little pride in the fact that during the last ten years I have from time to time, as far as my poor ability would allow me, lent both my voice and pen to the view that man arose upon earth at a far remoter period in its history than a few *thousand* years amount to, as many eminently good people would yet have us to believe.

R. W. SHUFELDT.

Takoma, D.C., Nov. 17.

The International Geological Congress.

THE month of August, 1891, witnessed a remarkable gathering of scientific bodies at the capital. No less than nine organizations engaged in pursuits of a scientific character met in convention in Washington. From the 10th of August to the 2d of September the following bodies held meetings, partly successive and partly contemporaneous: the American Microscopical Society; the Association of American Agricultural Colleges and Experiment Stations; the Association of Official Agricultural Chemists; the Society for the Promotion of Agricultural Science; a conference of American chemists, with the Washington Chemical Society; the Association of Economic Entomologists; the American Association for the Advancement of Science; the Geological Society of America; and the Fifth International Congress of Geologists.

As one who enjoyed the privilege of attending and participating in the three last-named gatherings, I have brought together a few memoranda of some of the many points of interest connected therewith, especially in the department of geology.

The Association for the Advancement of Science, instead of continuing for a week, as its custom has been, closed its fortieth session on Saturday, Aug. 22, and gave up the Monday and Tuesday following to the American Geological Society. During the year previous, death had removed from the list of American geologists three eminent names,— E. W. Hilgard, Joseph Leidy, and Alexander Winchell, the last of whom was the president of the society for the year. The opening paper was a beautiful tribute to his work and worth, by his brother, Professor N. H. Winchell of Minneapolis.