

dians, it is found that many of their characteristics and their respective courses of development are widely diverse. The former are habitually at peace; the latter habitually at war. The former coöperate with men, animals and plants; the latter antagonize men, slay animals and destroy or neglect plants. The former developed the highest attributes of humanity to the extent that they met the Spaniards as peers; the latter remained robbers and assassins. The former produced arts, rose into agriculture, and at one time made conquest of the waters; the latter are perhaps the most primitive of American peoples. The former tribe is populous and probably increasing in number, despite the invasion of their territory by white men; the latter has been reduced to a handful and is destined to disappear, probably within a decade, almost certainly within a generation, perhaps within a year or two. In a few characteristics the tribes are similar, in certain respects their courses of development have been parallel; but the differences are more striking than the resemblances. Both peoples have been subjected to hard conditions with unlike, but not necessarily incongruous results; as among fishes the darkness of the deep sea may lead either to development or elimination of the eyes, so among men stress of circumstance may lead either to the growth or to the decay of humanity.

In considering the relations between tribes and their environment it is desirable to avoid a common and natural misconception to which attention has been directed by Powell. There is indeed a direct relation between the physical characteristics of the individuals composing the tribe and their environment, in virtue of which the hard environment tends, through survival of the fittest, to produce excellence of physique among men as among the lower animals; but among mankind this direct re-

lation is overshadowed by an indirect relation passing through the institutions, arts, etc., of the human animal. The importance of this indirect relation is indicated by the generalization that the moveless plants are most, the moving animals less, and demotic mankind least affected by environment so far as purely physical or biotic characteristics are concerned; while the converse is true of the demotic characteristics. The same law is well illustrated by the Papago and Seri tribes. The Papago Indians were enabled to survive desert conditions by organization and by an assemblage of arts growing into agriculture; while the Seri, albeit of fine physique, have been enabled to survive only by tribal union, endogamy, a consistent system of warfare, and an assemblage of arts all adjusted to their habitat even more closely than the striking Seri physique is adjusted to desert-bound Seriland.

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NOTE ON THE PERMANENCE OF THE RUTHERFURD PHOTOGRAPHIC MEASURES.

ONE of the most interesting questions confronting practical astronomers at the present day is the question of how long the photographs which are now being accumulated in such great numbers will remain fit for measurement. To throw some light on this matter, I have caused some of Rutherford's Pleiades plates to be remeasured with the new Repsold measuring machine of the Columbia College Observatory. The present note is published in advance of the detailed account of the observations and their reduction, as the matter seems to be of immediate interest to astronomers. The measures have been carried out with great care by Mrs. Herman S. Davis and Mrs. Annie Maclear Jacoby. As measures of these same plates were made under Mr. Rutherford's direction by Miss Ida C. Mar-

tin soon after the plates were taken, in 1872 and 1874, a simple comparison with the new measures out to show whether the plates still admit of accurate measurement, and whether the positions of the star images have changed by an appreciable amount. It is to be noted of course that the Rutherford plates were made by means of the wet-plate process, using albumenized plates; so that the results of the present paper are not strictly applicable to the modern gelatine dry-plates. Yet it seems fair to suppose that the gelatine plates will be at least as permanent as those of Rutherford. In any case, the present research is of considerable importance because of the large number of Rutherford plates not yet measured, and the measurement of which would be useless if their precision has been seriously impaired.

It is therefore a source of congratulation that the new measures here described have not brought to light any such alterations of the photographic film as would invalidate measures made on the Rutherford plates twenty years after the date of exposure. In fact, we may say that in no instance does the difference between the new and old measure exceed such an amount as might reasonably be expected from the combined uncertainty of both. For the present purpose, I have not thought it necessary to re-measure all the plates treated in my paper on the *Pleiades* (*Annals N. Y. Acad. of Sciences*, Vol. 6, p. 239). Nor have all the stars been re-measured, since a few stars well distributed on the plate would undoubtedly bring any existing change to light. On the other hand, every care possible has been taken to make the measures as accurate as possible, except that the insignificant 'projection error' found by Donner to exist in the Repsold apparatus has not been taken into account. Of course this is of no importance in the work under consideration, because the elimination of the errors of pro-

jection would be almost certain to improve the average accord with the old measures. The same is true of any errors which may perhaps exist in the guiding cylinder of the Repsold machine, and which have also been neglected.

To avoid any possible bias in selecting plates for remeasurement, I determined to measure those plates to which even numbers had been attached by Rutherford at the time the plates were made. But we were unable to find plate number 20 among the plates deposited at Columbia College, so the remeasurement has been applied only to plates 16, 18, 22 and 24. On each of these plates eight stars were selected for remeasurement, distributed on the plate in a way well suited for bringing any disturbance of the images to light. After this work had been finished, it occurred to me that the stars selected were all fairly bright, and that it would be very desirable to measure some faint stars too. Accordingly six faint stars were selected, and were very carefully measured on plate 16. The stars Anon. 34 and 18 *m.* were used as standards on all the plates.

Inasmuch as the Repsold machine furnishes rectangular coördinates, whereas the Rutherford measures were in distance and position angle, it was necessary to compute the distances and position angles from the measured rectangular coördinates, before a direct comparison could be made. The following table contains the results of such comparison. In every case the ratio adopted for the quantity:

$$\frac{\text{Rutherford scale value}}{\text{New scale value}}$$

was such as would make the sum of the discordances in distance between the new and the old measures zero. Similarly, a constant was applied to the discordances in position angle, so as to make the sum of

these discordances zero. The discordances in position angle have been turned into arc of a great circle by multiplying them by the sine of the distance. For this reason the sum of the position angle discordances will differ slightly from zero, as the constant was applied before turning them into arc of a great circle. It should perhaps be remarked that the comparisons were made with the old Rutherford measures as printed in my paper on the *Pleiades*, already referred to,

without the application of any corrections whatever. In conclusion, I wish to express my thanks to RUTHERFURD STUYVESANT, Esq., who had placed at the disposal of PROF. J. K. REES, Director of the Columbia College Observatory, funds for the reduction of the RUTHERFURD plates. This has enabled the Observatory to secure the services of MRS. HERMAN S. DAVIS, who has relieved me of the very arduous labor of computation involved in the reduction of these measures.

TABLE OF DISCORDANCES,
RUTHERFURD MEASURES *minus* NEW MEASURES.

Star.	Plate 16.		Plate 18.		Plate 22.		Plate 24.		Means.		MAG.
	Angle.	Dist.	Angle.	Dist.	Angle.	Dist.	Angle.	Dist.	Angle.	Dist.	
A 34	0.00	-0.12	-0.24	-0.21	+0.07	+0.26	-0.20	-0.02	-0.10	-0.02	7.2
18 <i>m</i>	-.06	-.06	+.12	+.05	-.08	-.34	-.14	-.02	-.04	-.09	6.3
A 12	-.01	-.18	+.40	+.14	+.16	-.10	+.27	+.13	+.20	.00	7.5
A 22	-.04	+.27	-.06	-.08	-.06	+.19	-.04	+.06	-.05	+.11	7.0
A 24	-.02	+.16	.00	+.30	-.13	+.10	+.07	+.30	-.02	+.22	7.0
A 28	+.08	-.10	+.18	-.13	-.12	-.13	-.14	-.43	.00	-.20	7.0
A 30	-.02	-.01	-.45	+.08	+.17	-.01	-.17	+.00	-.12	+.02	8.4
A 39	+.41	+.03	+.14	-.18	+.39	+.02	+.20	-.01	+.28	-.04	7.7
A 34	+0.14	-0.15							+.14	-0.15	7.2
18 <i>m</i>	+.03	-.17							+.03	-.17	6.3
A 5	-.26	+.06							-.26	+.06	9.1
A 6	-.05	+.03							-.05	+.03	9.0
A 11	+.04	+.06							+.04	+.06	9.1
A 26	+.19	+.12							+.19	+.12	9.0
A 27	+.03	+.03							+.03	+.03	8.5
A 36	-.26	+.02							-.26	+.02	8.5

COLUMBIA COLLEGE OBSERVATORY, March 10, 1896.

HAROLD JACOBY.

ANNUAL RECEPTION AND EXHIBITION OF THE NEW YORK ACADEMY OF SCIENCES.

THE New York Academy of Sciences held its third annual reception on the evening of March 16th, at the American Museum of Natural History. The reception included an exhibition of apparatus and specimens illustrating the progress of science during the year, and more particularly the work done by scientific men in and about New York. The exhibition in the afternoon was thrown open to students in

the various educational institutions of the city, teachers and other persons interested in science, while the reception in the evening was attended by the members of the Academy and a number of guests. Both occasions were remarkably successful, the exhibits being of the same high character as have been shown at the previous receptions. The exhibition took place on the second floor of the Museum, which was kindly placed at the disposal of the Academy and was under the direction of Prof.