

## Note on the Remarks on Jupiter's Satellites in A. N. 3453.

By *T. J. J. See.*

During the past year I have seen much of the work of Mr. Lowell and Mr. Douglass on planetary detail, and from my knowledge of their researches and the conditions under which they have been made, am greatly surprised at the reasoning employed by Professor Barnard in A. N. 3453. He tacitly assumes that in this work the most essential thing is a big telescope, when recent progress in observational astronomy has shown that the effects of atmospheric waves — which cause blurring and obliteration of detail — increase enormously with large apertures. I have elsewhere discussed the effects of these phenomena, but they are not yet fully appreciated by those who base their opinions on what happened several years ago; for the existence of these waves and the method of observing them were only recently established by Mr. Douglass at this observatory, and we are still occupied with their investigation.

It has been as clearly proved as anything can be that the largest aperture is not suitable for the kind of studies here contemplated, as well might one attempt to divide close and unequal double stars with the six-foot Reflector of Lord Rosse; and from the same cause the Lick 36 inch and the Yerkes 40 inch will be wholly unable to show much of the fine detail that is clearly and incontestibly visible with the 24 inch. In expressing this view I am supported by the systematic comparison of the seeing in the 6 inch with that in the 24 inch during the past year, when we have found the scale in the smaller aperture higher than in the great telescope by 2, 3, 4, or 5 points; which means that with the 36 inch and the 40 inch (under the same atmospheric conditions) the scale will be lower by about one half than it is in our 24 inch. Mr. Lowell has found that the increase in aperture of his telescope from 18 inches (used here in 1894-95) to 24 inches has materially lowered the scale of seeing, and that the time when the aperture of 24 inches can be advantageously used is considerably less than was the case with the 18 inch in 1894-95. It is also worthy of note that dozens of large telescopes were used in studies of Mars before and since 1877, but that Schiaparelli's memor-

able discoveries were made in the year named with a comparatively small aperture (21.8 cm = 8.6 inches). The subsequent studies of this planet of most value have been secured with moderate sized instruments — and the reason of the failure of large apertures is now very clear, viz. the blurring due to the greater complex of waves traversed by the light entering large telescopes obliterates the detail.

In view of these facts, I am convinced that any attempt to see the markings on Jupiter's satellites with a 36 inch or 40 inch telescope will almost necessarily fail; for if the markings be visible in such instruments it will be for very short intervals only, and as the observer will generally see only vague and hazy outlines, he may not recognize the real phenomena at all. On a number of occasions in Mexico I made drawings of several of the markings on the third satellite, in essential accord with the more careful and elaborate work of Mr. Douglass; and these sketches of mine were made at an early date, before Mr. Douglass had made any map of the surface, and when he and I were equally uncertain as to what the phenomena ought to be. The reality of the markings drawn is absolutely beyond dispute, but they will never be shown by a very large aperture in a moderately good or a bad atmosphere. As my own speciality is along the line of double stars, I will make no claim in regard to what my experience would enable me to see; perhaps the forthcoming catalogue of new double stars may offer some testimony on this point that will be interesting to observers. In view of the assumption that anything which can be seen at all can be seen with a very large telescope, I have thought it proper to point out the weakness of the foundation on which certain claims rest; and to add that in due time Mr. Douglass will doubtless give his and my own work in more detail. It would be very satisfactory to us if observers who may doubt our views would try the experimental method: namely, remove the eye-pieces of their telescopes and study carefully the kind of atmosphere through which their work is done.

Lowell Observatory, Flagstaff, Arizona, 1897 Nov. 9.

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## Note on Southern Double Stars.

I recently came across a list of 50 new pairs discovered at Cincinnati by Prof. Howe in 1876 which I had previously not seen — an examination shews that three pairs I thought to be new are in this list:

No. 214	Lac. 4932	11 <sup>h</sup> 49 <sup>m</sup>	— 37° 12'	is Howe 17
» 217	» 5066	12 8	— 33 14	» » 19
» 222	» 5656	13 38	— 39 40	» » 23

Prof. Howe's estimates are 21 years earlier than mine and we find:

	Howe — Innes	
	P. A.	Dist.
No. 17	— 10°	0".0
No. 19	0	+ 0.1
No. 23	— 5	0.0

Hence the stars may be considered as probably stationary. No. 17 has a large common proper motion. No. 19 is noted as triple in Harvard Circular 18 (A. N. 3447). Prof. Howe's list seems to have been overlooked by several double star discoverers.

Royal Observatory, Cape of Good Hope, 1897 Nov. 6.

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