(printed if possible on one side of the paper only) of those periodicals which also contain original matter.

IV. The committee of experts has charged certain of its members with the duty of getting into touch each in his own country with those most competent to prepare the details of cooperation.

The results of these negotiations shall be communicated to the institute, which shall make use of them in summoning first those interested in each separate group, and afterwards for the reunion of the full conference, which will be necessary before the attempt to bring into operation the proposed cooperative arrangements.

V. The conference of experts consider that a universally adopted system of abbreviations of the titles of periodicals would be an advantage which would outweigh the temporary inconvenience of changing the many existing systems.

They have been informed that bibliographical experts belonging to the British Museum have considered current systems and have devised a system which they have applied to the titles of 24,000 periodicals and that this list of abbreviations has been printed in Volume 2 of the World List of Scientific Periodicals.

They recommend that at their next meeting the possibility of the universal adoption of this system should be taken into favorable consideration.

These resolutions were approved by the international committee in July and by the Plenary Assembly of the league of Nations last September, and the institute was instructed to take the necessary action in order to put them into force.

It now remains to be seen whether biologists in general and in particular the editors of biological journals are sufficiently interested in this undertaking to make it a success.

As appears from the resolutions, the experts were of opinion that the different subdivisions of biology should be treated separately and the question now is to decide which of these subdivisions can most easily be made the subject of a common agreement, so as to concentrate on it in the first place.

Another aspect of the problem, which could not be dealt with at the time of the experts' meeting, is the extent to which our scheme should be altered in view of the publication of the *Biological Abstracts* in the United States, because before the meeting of the committee only one number had appeared.

The International Institute will welcome suggestions from the editors of biological reviews concerning the biological problems referred to in the experts' resolutions and will be glad to avail itself of their recommendations and collaboration in pursuing this work.

J. E. DE VOS VAN STEENWIJK

SECTION FOR EXACT AND NATURAL SCIENCES AT THE INSTITUTE OF INTELLECTUAL COOPERATION

SPECIAL ARTICLES

VARIATION IN SOLAR RADIATION

THE Lick Observatory Bulletin No. 401 carries a series of measurements of the brightness of the planet Uranus and of the satellites of Jupiter by Stebbins and Jacobson. Similar measurements were made by Stebbins in the year 1926, also at the Lick Observatory. They employ a potassium cell, most sensitive in the blue, at approximately 4,600 Ångstroms.

Measurements were made on about twenty nights of August and September, 1926, and on about fifty nights in July, August and September, 1927. During these intervals the Smithsonian Institution maintained daily observations of the solar constant of radiation at its station on Mount Montezuma, in Chile. It is interesting to compare the two series (omitting dates not common), to see what they may indicate as to the variation of the sun during these intervals.

In making such a comparison, one might proceed with the theory that the sun is equally bright at all parts of its surface, and, if it varies, it varies as a whole in brightness. But many indications lead us to the other view that although, associated with the march of solar activity revealed in sun-spots, there are changes of the general brightness of the whole solar surface, yet, just as the solar corona and the solar surface present much detail to the telescope, so the sun as a source of radiation presents inequalities of surface brightness turned toward the different directions in space. Accordingly, it seems best to take into account the heliographic longitude of the satellites and the planet observed by Stebbins, and also to consider the time occupied by light in traveling from

OBSERVATIONS OF 1926

Dates		Departures: Tenths per cent.		Difference—Montezuma from Satellites
Montezuma	Lick	Montezuma	Lick	
August				
24	24	−1	+ 1	2
25	25	−1	+ 1	2
27	27	+4	− 5	9
28	28	−1	− 2	1
30	29	+2	−10	12
32	31	−2	+ 1	3
Sept.				
2	1	+1	− 2	3
3	2	−2	− 2	0
4	3	−1	0	1
5	4	+2	− 4	6
6	5	+2	+ 5	3
7	6	+4	+ 2	2
8	7	−1	− 1	0
9	8	−2	+ 7	9
		—	—	—
	Means:	2	3	4

the sun to these distant mirrors and thence to the earth, and to correct the dates of the observations of Stebbins and his colleague to correspond with the dates of observation of the solar constant, by allowing for the time intervals required for the sun to rotate from the direction of the satellites and the planet to the direction of the earth.

The Lick observations are published as departures in stellar magnitudes from the mean brightness of the objects during the whole interval of observation. The solar constant measures at Mount Montezuma are given in calories per square centimeter per minute. I have reduced all these results from both stations to the corresponding condition of percentage departures from the mean values prevailing during the periods of observation. To avoid repetition of useless figures, I express these departures in tenths of a per cent.

It will be noted that the range of departures for the solar constant scarcely exceeds 1 per cent., while the range of the photoelectric measurements is somewhat greater. Stebbins and Jacobson decided that the measurements on Uranus in 1927 have greater weight than those on the satellites, as is indeed indicated by their smaller range.

The solar constant values as here employed are all reduced by the definitive method in which every known source of error has been eliminated, including systematic errors requiring several years of observation for their determination. They are as accurate, we think, as can ever be obtained.

On the whole, there is agreement on both sides that the short-interval solar variations during these periods were very minute. As the photoelectric measurements are not quite equal in accuracy to the solar constant measurements, it is not possible to be sure whether they really support one another in singling out any of the apparent minute solar variations as real. The agreement between Montezuma and Uranus from July 27 to August 10, 1927, is very close, but reveals no considerable solar changes. During the interval from August 19 to August 31, when Montezuma seems to indicate a range of 1 per cent. very consistently, the agreement, otherwise close, is marred by four considerable departures.

OBSERVATIONS OF 1927

Dates Lick			Departures: Tenths per cent.			Differences—Montezuma from Lick	
Montezuma	Satellites	Uranus	Montezuma	Satellites	Uranus	Satellites	Uranus
July	July						
27	24	23	+2	− 4	− 1	6	3
28	25	24	+1	−24	− 2	25	3
29	26	25	−3	− 8	− 2	5	1
30	27	26	+1	−10	− 4	11	5
31	28	27	0	.....	− 1	3	1
32	29	28	−1	− 4	− 1	3	0
33	30	29	+1	− 2	− 1	1	2
34	31	30	−1	− 2	0	3	1
35	32	31	−1	+ 2	0	.....	1
August	August						
5	2	1	0	+ 6	− 2	6	2
6	3	2	0	− 6	− 2	6	2
7	4	3	+1	.....	− 2	.....	3
9	6	5	−2	−13	− 2	11	0
10	7	6, 7	−1	− 1	− 1	0	0
11	9	8	−5	+ 4	0	9	5
14	12	11	−2	.....	+ 4	.....	6
17	15	14	0	+ 4	+10	4	10
18	16	15	+2	− 1	+11	3	9
19	17	16	−5	+ 6	− 3	11	2
20	18	17	−1	+11	− 9	12	8
21	19	18, 19	−6	+10	+ 4	16	10
22	21	20	−4	− 1	+ 9	3	13
23	22	21	−5	+ 2	− 6	7	1
24	23	22	−4	− 4	+ 1	0	5
26	25	24	−2	.....	+11	.....	13
28	27	26	−2	.....	− 2	.....	0
31	30	29	+5	.....	+ 6	.....	1
Sept.	Sept.						
3	3	2	0	.....	+ 6	.....	6
6	6	5	0	−20	− 4	20	4
19	19	19	0	0	+ 4	0	4
20	20	20	+1	.....	− 3	.....	4
21	21	21	+5	− 2	− 2	7	7
22	22	22	0	.....	− 6	.....	6
23	23	23	+3	− 2	− 4	5	7
24	24	24	+2	0	+ 5	2	3
29	29	29	−1	− 2	− 2	1	1
Means:			2	6	4	7	4

It will be noted that the range of departures for the solar constant scarcely exceeds 1 per cent., while the range of the photoelectric measurements is somewhat greater. Stebbins and Jacobson decided that the measurements on Uranus in 1927 have greater weight than those on the satellites, as is indeed indicated by their smaller range.

The solar constant values as here employed are all reduced by the definitive method in which every known source of error has been eliminated, including systematic errors requiring several years of observation for their determination. They are as accurate, we think, as can ever be obtained.

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C. G. ABBOT

SMITHSONIAN INSTITUTION

SOCIETIES AND ACADEMIES

THE NORTH CAROLINA ACADEMY OF SCIENCE

THE twenty-seventh annual meeting of the North Carolina Academy of Science was held at the University of North Carolina, Chapel Hill, N. C., on April 27 and 28, 1928. Papers were presented before the general section of the academy on Friday morning and afternoon. Friday evening the retiring president, Dr. J. M. Bell, gave his presidential address on "Some Approaches to Fundamental Theory of the Physical Sciences." Saturday morning the academy met in the following sections: General section, chemical section, mathematics section and physics section. Seventy-nine papers and five exhibits were on the program (abstracts of most of these papers and complete papers of several will appear in an early num-