THE INDIAN EPHEMERIS AND NAUTICAL ALMANAC*

WE heartily welcome the publication of this first issue of the *Indian Ephemeris and Nautical Almanac* for the year 1958. The Director-General of Observatories has referred, in the Preface, to the division of labour between six countries as regards the actual calculations and computations of the figures constituting the different tables of an Ephemeris. We hope that, in course of time, it would be possible for this country to share some part of this labour instead of getting year after year advance data from other countries, and merely incorporating them in our Ephemeris. There is an urgent need to set up a first class Astronomical Observatory in the country which will undertake several types of routine observations, and also bring together a team of workers able to collate and prepare advance data from the numerous fundamental astronomical tables, and catalogues. Only then will it be possible for us to be equal partners in the international agreement regarding the preparation of basic tables.

The actual *Ephemeris* is preceded by an introductory note on the history of the development of astronomy in India in the earlier times, specially from 400 A.D. onwards. This introduction is very interesting, but not sufficiently comprehensive, in that it does not mention other contemporaneous *siddhantic* systems prevalent in several parts of the country, specially in the South. The author has referred to the "*Bija* corrections" applied to the *Surya-Siddhanta*, but nowhere has he indicated the astronomical significance of these corrections. The suggestion on p. xi that the value of 131′ Sin g', given by the Indian astronomers for the equation of the centre might have been the value for ☉—☽ does not appear convincing, since as pointed out in p. x, the inequality of the moon due to the annual equation was not used by them, and it should not be surprising if two equal errors of opposite signs cancelled each other to give the correct result. It is unfortunate, although it is a very trivial error, that the author should have used g and g' in the Introduction for the mean anomalies of the moon and sun respectively, while it is g' and g in the body of the *Ephemeris*. Without casting any reflection on the excellence of this introduction, we wish to suggest that there is really no need to include it in all future issues of the *Ephemeris*.

Coming to the actual *Ephemeris* itself, it must be said that the several tables have been carefully chosen with an eye on essential needs, and fundamental importance. The compiler has done very well in retaining Universal Time in almost all the tables, and not converted it into Indian Standard Time. Such conversion would have meant much unnecessary labour, and really serves no useful purpose except perhaps an empty sentimental satisfaction. It would take too much space in this short review to indicate in detail how the tables of the I.A. differ from those of the A.A., and the N.A., and what exactly are the adaptations from these latter sources used in the former. We may, however, mention a few salient points. In the tables for the Sun, reasonable omissions in a first issue are those giving rectangular co-ordinates of the Sun, reductions of these to the true equinox of date, and also tables for these co-ordinates for the epoch 1950. Similarly, the table giving G.M.T., apparent and sidereal time and semi-diameter of the Sun at transit at Greenwich is omitted since this has no real significance for India. The tables for the Moon are fuller than those for the Sun, but we would have liked to have seen in the table "Moon at transit at Greenwich" the inclusion of three more columns giving apparent geocentric R.A. of centre, S.D. of passing the meridian, and equatorial horizontal parallax, since the Moon plays an important part in Indian Astronomy. In the tables for the planets, Pluto might perhaps been omitted in this first issue. In the tables for the stars, we notice that in the footnotes of the tables for mean places of 482 stars, popular names for some of the stars are given in Arabic. With a little more trouble, the corresponding names of at least the well known stars should have been given in Sanskrit also, since such information would have been useful to almanac-makers in this country. The tables relating to eclipses are very well compiled, and in this particular case, the I.S.T. might well have completely replaced U.T. without much labour. While it is no doubt a correct decision to omit all reference to occultations, some space might have been allotted to the physical Ephemerides relating to the Sun, Moon, and Planets. The miscellaneous tables of Part IV (pp. 294-324, and pp. 333-34) have been, in several cases, suitably adapted to Indian

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conditions, and are bound to be very helpful. A table giving the angular distance of the Sun from the Moon might have been given as in the *American Ephemeris*, since the *Tithi* in Indian Almanacs is based on this elongation.

It may be pointed out that the explanations of the tables as given on pp. 379-90, are not clear and self-contained in a few cases. Nobody certainly expects any detailed explanation about the compilation of the tabular matter or about spherical astronomy, but the explanation should be clear, and make the tables unambiguous. Thus, on p. 382, bottom, correct explanation is given for the derivation of the Sun's apparent longitude for the true equinox of date, but in the case of apparent latitude referred to the true ecliptic of date, no explanation is given; in fact, the use of the correction $-0{\cdot}471_T \sin(\lambda - 174°)$ should have been indicated. No explanation is offered as to how the inclination of the ecliptic to the true equator of date has been calculated except to say that it includes long-period terms of nutation in obliquity. From an examination of the tables (pp. 18-21) it is not clear whether it is necessary to use the Besselian Day numbers or not, in obtaining the true obliquity from the mean value given on p. 22, and one is at a loss to know how the calculations have been made. For the tables relating to the apparent places of 68 stars (pp. 260-79), the corresponding explanation should have indicated the meanings of the entries "Sec δ, Tan δ, Dble. Trans, a, a', b, b'" which occur at the bottom of these tables. Also the explanations relating to the Besselian Day numbers do not appear to be adequate.

The last part of the *Ephemeris* contains the Indian Calendar as part of it, in accordance with the recommendations of the Calendar Reform Committee accepted by the Government of India. This reformed Calendar is preceded by a small useful explanatory note which should be of much help to the numerous *Panchanga*-makers of our country. It is very necessary that this Calendar should be popularised early, and towards this end, the Calendar may be printed separately at a lesser cost, also translated into Sanskrit, and made available to suitable authorities in the several States who, in turn, could have them translated into the State languages, and passed on to the almanac-makers of the regions concerned. We are a little disappointed not to find a single letter of the Sanskrit alphabet anywhere in the whole volume; at least a suitable motto might have been inserted on the front page. In showing the holidays, conventions followed in the different States have been observed as far as possible, and the total number of holidays, including those for the Moslem and Christian festivals, is only 166, and not 366 as we expected to find! In spite of the great care shown in listing the holidays, some discrepancies could, however, be found. Such a glaring one is the omission of the mention of the Lunar New Year's Day festival on 21-3-1958, which is observed all over the South and Maharashtra under the names of *Yugadi* or *Gudi Padwa*. Similarly, it appears from the Calendar that *Bali Padyami* falls on *Amavasya* day, and *Utthan Dwadasi* on *Ekadasi* day. It would have been more appropriate if the important Moslem and Christian festivals also had been shown in the main Calendar, and not in separate lists. In view of the above remarks, we wish to suggest that in future editions of the Calendar, only the holidays declared by the Government of India may be shown, and it may be left to the State to include in their adapted Calendars the several regional festivals. The names of the Zodiacal signs instead of being shown separately as on p. 390 might have been indicated by their Sanskrit names at the bottom right-hand side of the Calendar just as the names of the *Nakshatras* have been shown in the left-hand pages. The Calendar, as printed, includes data for both the *Saka* Eras, 1879 (in part), and 1880, but the names for these eras on the well-known sixty-year cycle starting *Prabhava, Vibhava*, etc., could also have been indicated. In fact, the names of the years of this cycle should have found a place in some part of the Calendar.

The get-up of the *Ephemeris* which is on the American model, the printing, and the arrangement of matter leave little to be desired. The strenuous work of compilation has been done very satisfactorily, and it is to be hoped that in future editions, suitable additions and amplifications will be incorporated. This first Indian *Ephemeris* is an excellent piece of work.

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