

FORUM

The Use of Apparent Consistency in Errors of Latitude in the Identification of 16th and 17th Century Pacific Island Discoveries

from Dr. Colin Jack-Hinton

IN several studies of the Spanish and Dutch voyages in the Pacific in the sixteenth and seventeenth centuries it has been suggested that an apparent consistency in errors of latitude determined by the navigator in question can be used as evidence in the identification of island discoveries, and can be regarded as confirming the identification of one or the rejection of another possibility. I am extremely doubtful about the validity of using such apparent consistency of error, even as secondary evidence combined with other indications, and have no doubts about its invalidity as primary evidence.

Andrew Sharp, for instance, when considering the identification of the Los Bajos de la Candelaria of Mendaña's voyage of 1568 in his *The Discovery of the Pacific Islands*, remarks that whilst both Ontong Java and Roncador Reef in the Northern Solomons are possible identifications: 'The steady southerly error in Gallego's latitudes . . . points to Ontong Java'. (Sharp 1960, 44. On the basis of the total evidence I favour the identification of Roncador Reef.) Furthermore, whilst it may be true, as Wallis remarks, that in most of the accounts of the Spanish Pacific voyages of this period an error of between +10' and +1° is to be found (Wallis 1954, 13), this does not justify the kind of assertion made by Guppy, to the effect that:

'On making fourteen comparisons of the latitudes obtained by Gallego with the latitudes of the same places in the most recent Admiralty charts . . . I find that all but two are in excess of the true latitude. The excess varies between 11' and 1° 7' (about); and since seven of the twelve latitudes vary between 38' and 46' excess, we may take 40' plus as about the probable and average prevailing error' (Guppy 1887, 274).

Quite apart from the admitted variability of the degree of error, the existence of any exceptions to the pattern of general consistency is sufficient in itself to impose a severe restriction on 'consistency' as a means of identification. This is well illustrated by Sharp who, in examining the landfalls made by Schouten and Le Maire in 1616, rejects Ontong Java in favour of Nukumanu as an identification on the grounds that: 'The persistent southerly error in the latitudes of Le Maire's voyage south of the line can be taken to rule out Ontong Java 30 miles south of Nukumanu' (Sharp 1960, 76), but accepts the obvious identification of Marquen with Tau'u, an island which the voyagers estimated to lie in 4° 45' S. and which in fact lies in 4° 50' S., without comment on the near-accuracy and northerly

error of Le Maire's latitude. Le Maire admitted that the latitude of Marquen was estimated in relation to an earlier landfall, which may have been either Ontong Java or Nukumanu, indicating (since the northern extremity of Ontong Java bears in relation to Tau'u as $4^{\circ} 47'$ (the estimated latitude of the first landfall) bears in relation to $4^{\circ} 45' S.$ over the same distance) that Ontong Java is the more likely identification.

Quite apart from anything else it seems somewhat dubious to postulate a consistent error on the evidence available, and to utilize that error, without attempting to offer any explanation for it; and in none of the studies which have been made of early Pacific discovery in which this factor is mentioned has any such attempt been made. If it could be shown, for instance, that the navigator in question was navigating by dead reckoning or that a series of latitudes were determined by D.R. in relation to an original latitude determined by observation, then it would be true to say that an error of latitude on one occasion would thereafter be continued consistently in subsequent plottings until obviated, reduced or increased by another error. In the voyages of the sixteenth and seventeenth centuries with which this note is concerned we do know that latitudes were determined by observation of the Sun's meridian altitude, and were reconciled with the D.R. position. When the latitude was determined by a solar observation, and that latitude was in error, the error could have been carried forward consistently over the few days which might elapse until another solar observation was taken, but this would only be a short-lived consistency. On the other hand, in a succession of solar observations some degree of consistency might result from an error in the tables of declination. It might also result from a failure to allow for the difference between the actual declination and the declination given in the tables; the difference itself resulting from the difference in longitude between the meridian of the vessel and the meridian of the place where and for which the tables of declination were compiled. It might also result from a particular error in the instrument used. It is not, however, sufficient to show a possible cause of consistent error, particularly when such a cause might or might not have produced it; and if such error is to be relied on at all its cause or causes must be clearly explained and demonstrated.

John Davies, in his 'Seamen's Secrets' of 1594, comments on the neglect of this necessary interpolation; and as late as 1771, Alexander Dalrymple, in his 'Memoir on a Chart of the South Sea', remarked of the latitudes of a Spanish chart of 1753, that he understood on the authority of one of the best Manila pilots that the Spaniards commonly took the wrong day's declination, Manila's date being taken from the westward. If allowance had been made for the difference in longitude between Manila and the place for which the tables were set, this factor would have been irrelevant. When it is appreciated that the Sun's declination can alter by as much as $30'$ in the space of 24 hours, particularly at the equinoxes, failure to allow for even an approximate difference of longitude could cause a substantial error.

We do know that such instruments as the astrolabe and quadrant, although not dependent on the visibility of the horizon, suffered much greater disadvantages than the modern reflecting sextant, and that the circumstances of taking an observation on the deck of a low-freeboard vessel heaving on the breast of the Pacific would have tended to cause an error in the observation. (Quiros wrote in 1610: 'If four pilots, even though they be ashore, observe the altitude of the Sun or stars with the same instruments, they will find more or less difference,

seldom agreeing, and when they repeat their observations they will find a new difference' (Zaragoza 1876: II; 363–364.) Furthermore, not only would these factors, even without being coupled to human errors, have tended to make an observation difficult, but they would have rendered an accurate observation virtually impossible, except by sheer chance or luck. They would not, however, have caused a consistent error; and even though a consistent error might have resulted from one or other of the factors which have been suggested in the preceding paragraph, their consistency would have been destroyed by the inconsistencies caused by the instruments or techniques of observation.

The extent of any error can only be gauged in relation to an identified landfall, and whilst some writers write blithely about consistency of error, they seem to fail to appreciate that in a transpacific voyage on which few landfalls were made the instances in which a recorded latitude can be checked represent but a small percentage of the total number of latitudes logged. To suggest, for instance, that a particular navigator showed a tendency to a southerly error in his latitudes on the strength of a few checks against identifiable landfalls (identifications which may in any case be disputed), when those latitudes may represent a very small proportion of the latitudes recorded, seems to be rather a rash assumption. There may well be support for this view in the latitude which Gallego observed at Estrella Bay, Santa Ysabel (Solomon Islands), which, if the normally accepted identification of the bay is correct, was only in error by $-5'$. If any of the observations which Gallego recorded were made on land and with great care, this was certainly one of them. This being so, its relative accuracy and its minus error would seem to indicate that in this case at least no cause existed for a consistent error, and that the errors of the other observations were the result of a variety of factors all tending to inconsistency.

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Long-range Navigation Aids

from J. E. D. Williams

FOR a quarter of a century now we have struggled in a curiously impotent way with the problem of long-range navigation of civil aircraft and the associated