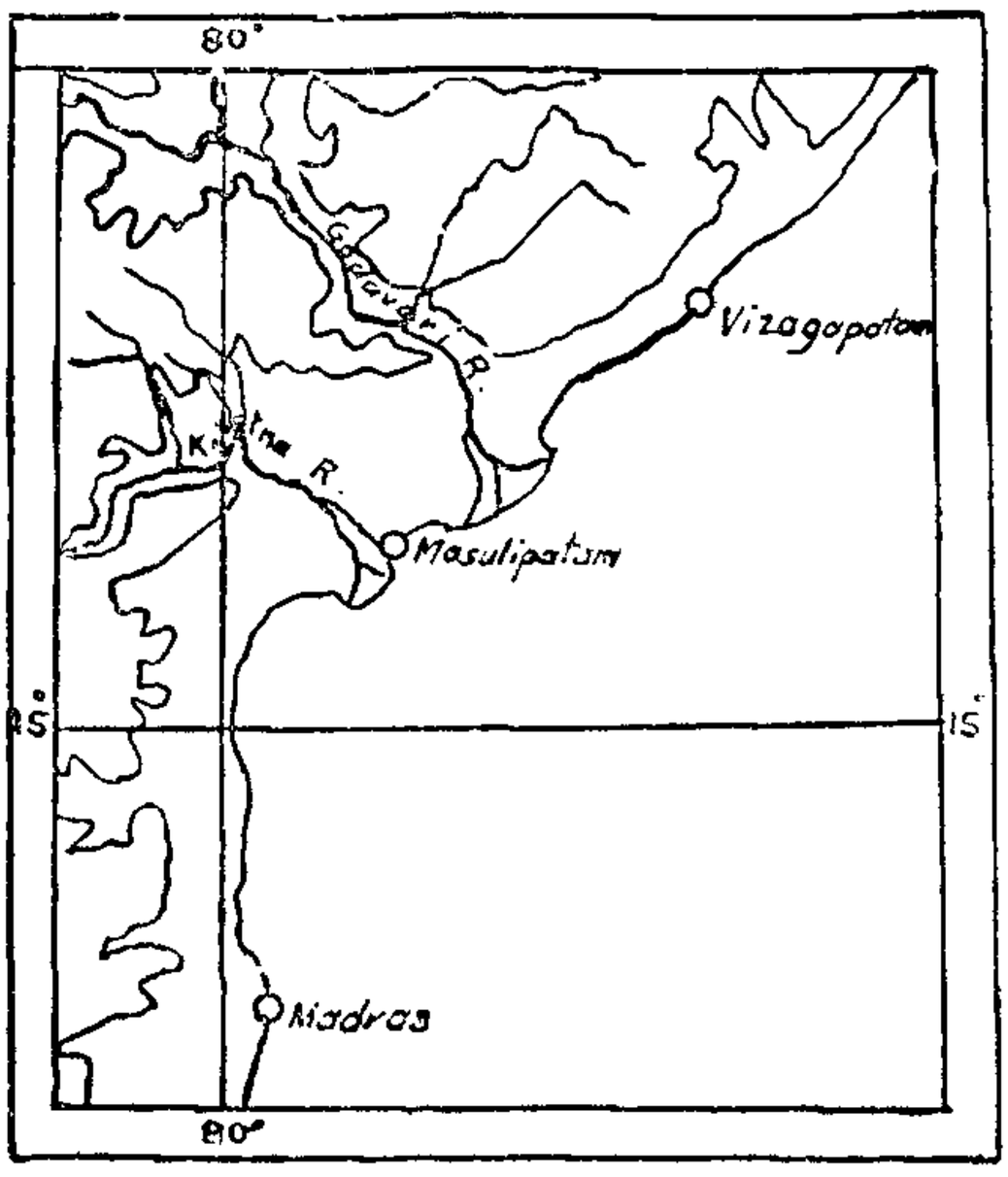
LETTERS TO THE EDITOR

LOWER LEVEL WINDS ALONG THE DELTAS OF THE NORTH MADRAS COAST IN THE MONSOON

WHEN the pilot balloon observatory was started at Masulipatam in 1942, it filled a gap between the observations at Madras and at Vizagpatam on the east coast of India. Soon after, it was noticed that the actual wind speed at lower levels of 0·5 and 1·0 km. at Masulipatam was much greater than at corresponding levels either at Madras or Vizagpatam. An application of the equation of continuity was attempted. The weather along the north Madras coast is free from precipitation except when a monsoon 'pulse' is passing over the place. At other times the upward velocity can be assumed to be negligible: Only the horizontal velocities need be considered. The modifications in the latter can only be due to orography (see figure).

Masulipatam is on the northern side of the Krishna delta and within 30 miles of the southern stream of the Godavari delta. The two deltas almost overlap. Taking account of the 1000 ft. contour, the Godavari valley is almost N.W. to S.E.; and the Krishna valley (north of the Nallamalai Hills) is almost W. to E. At a station situated on the overlapping portion of the deltas of Godavari and Krishna, the winds flowing down the two valleys must blow together or coalesce. The directive effect of the orography persists up to twice or thrice the height of the valley from the sea level (or up to about 3,000 ft. or 1·0 km. above sea level). Above this height, there would be very little influence.



The west to east stream in the monsoon on the north Coromandel coast is the monsoon air mixed with other air while the northwesterly is

the dry continental air that goes to form the monsoon depressions. The latter air is well pronounced over the more extreme portions of the north Madras coast. The nearest pilot balloon observatory which can give the values of the W. to E. stream south of Masulipatam is Madras. The nearest observatory north of Masulipatam giving an idea of N.W. to S.E. stream is Vizagpatam. The distance between these latter observatories is great from Masulipatam. The values of wind speed and direction can only be approximations to those flowing along the valleys. The following table gives the average wind for the months of July and August for the three years 1942-45.

TABLE
Average Upper Winds in Mid-Monsoon

Height above	Madras		Vizaga-patam		Masuli-patam		Madras + Vizag	
M.S.L.	D	V	D	V	D	V	D	V
0·5 km. ..	265	6·1	250	7·0	270	12·0	260	12·9
1·0 km. ..	275	7·3	270	7·2	280	12·9	270	14·4
1·5 km. ..	280	9·1	285	8·9	285	12·3	285	18·2
2·0 km. ..	280	10·6	285	9·8	285	11·8	285	20·5

D is the direction to the nearest 5°, and V speed (metres/sec.). The addition of wind velocity is vectorial.

It is seen that the algebraic sum of winds at Madras and at Vizagpatam are nearly of the same order but greater than at Masulipatam at 0·5 and 1·0 kms. At higher levels there is little comparison. It is surprising that such a good fit at the lower levels could be found considering the various uncertainties that enter meteorological quantities. If the winds at Masulipatam had exceeded the algebraic sum of the winds at Madras and at Vizagpatam at lower levels, the idea of applying the equation of continuity would necessarily have been open to question. It is not often that such simple applications are met with in weather.

During the other months, when the winds do not blow along the valleys of the rivers, *e.g.*, in the N.E. monsoon, there is no abnormality in the winds at Masulipatam.

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THE ESTIMATION OF THALLIUM

NUMEROUS volumetric methods have been proposed, which makes use of the reaction $Tl^{+} \rightarrow Tl^{+++}$ Most of the common oxidising agents have been tried and reported to yield useful results: Potassium permanganate,[1] Potassium bromate[2] and Ceric sulphate.[3] While a considerable saving in time may be effected, these cannot be regarded as very satisfactory; for, the normal potential of the $Tl^{+} \rightleftarrows Tl^{+++}$ system is about + 1·2 v., and an indicator which will function under these conditions is hard to find. The use of irreversible indicators like methyl orange sometimes leads to faulty endpoints, or one has to take recourse to complicated potentiometric methods. A rapid gravimetric method will, therefore, prove of some interest and the following procedure is believed to serve the purpose.

Procedure.—To the cold thallous solution containing not more than 0·2 gr. of the metal per 50 ml. are added with stirring 20 ml. of a 5 per cent. solution of iodic acid and 10 ml. of alcohol. The heavy white granular precipitate which comes down immediately is allowed to settle for a couple of minutes, filtered through a Jena glass filter of porosity 4, washed preliminarily with a mixture of equal volumes of 1 per cent. iodic acid and alcohol and finally with 50 per cent. alcohol, dried at 105°-110° C. and weighed as $TlIO_3$, factor for thallium = 0·67836.

Results.—A standard solution was made by converting 8·0973 gm. of pure thallium metal into the sulphate and making up the solution to 1 litre. Aliquots of this solution, either directly or on proper dilution, were pipetted out, for each determination. Simultaneously, estimations of thallium were carried out employing the chromate method of Moser and Brukl.[4] The measuring flasks and pipettes used were those tested and certified by the National Physical Laboratory as conforming to A grade accuracy; these were further calibrated in this laboratory. Some of the results are detailed below.

Thallium taken (gm.)	Amount found in estimation as iodate (gm.)			Amount found in estimation as chromate (gm.)
	Minimum	Maximum	Average*	
0·2024	0·2004	0·2038	0·2020	0·2017
0·1619	0·1610	0·1620	0·1615	0·1618
0·0506	0·0498	0·0508	0·0503	0·0507
0·3239	0·3230	0·3241	0·3238	0·3236
0·4049	0·4041	0·4052	0·4048	..

* Represents the average of 5 estimations.

It will be noticed that at lower concentrations of the thallous ion the iodate values are slightly lower. This possibly arises from a slight solubility of the iodate precipitate. According to LaMer and Goldman[5] the solubility of thallous iodate in water at 25° C. is about 0·7 gm. per litre, but under the above conditions of precipitation, the salt is almost insoluble. Further study of this aspect of the problem is in progress.

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1. Beale, Hutchison and Chandler, *Ind. Eng. Chem. Anal. Edn.*, 1941, **13** 210 2. Zintl and Reinecker, *Z. anorg. allgem. Chem.* 1926 **153**, 276 3. Willard and Young, *J.A.C.S.*, 1933, **55**, 3651. 4. Moser and Brukl, *Monatsh.*, 1926, **47**, 667. 5. LaMer and Goldman, *J.A.C.S.*, 1929, **51** 2632.