CURRENTS ON THE SOUTH AFRICAN COAST, AS INDICATED BY THE COURSE OF DRIFT BOTTLES.

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Part I.

The following is a record of the course of a number of drift bottles sent off at various localities in the sea surrounding the South African coast.

The method adopted was simply to drop into the sea a small bottle (2 oz.) containing a card with a request to the finder to return it, after noting the locality and time at which the bottle was found. Such a method of testing currents, of course, raises the obvious objection that a record is got more of wind direction than of sea currents. This objection has already been discussed elsewhere, and it need only be repeated that while it is to a certain extent valid, yet, in view of the fact that the bottles when afloat are fairly well submerged, and that the winds themselves are the chief causes of all surface currents, we cannot but attach considerable importance to the results of such experiments. Moreover, we shall produce some direct evidence that the course taken at least in one case was to be attributed more to current than wind. Of particular interest in this respect is the directions taken by bottles Nos. 108, 296, 316, and 318, the last two being set off in practically the same place and at the same time, yet, apparently, taking quite opposite directions.

The bottles consist of two series, viz.:—First, those set off at fairly regular intervals, and at fourteen definite points along the coast between Cape Town and Natal, from the mail steamers. At the request of the Meteorological Commission of Cape Colony the Union-Castle Steamship Company most willingly undertook to assist in the investigations, and the results, of which only a part is here reported on, are of special value on account of their regularity. The bottles set off in this way were numbered consecutively, and are distinguished here by the addition of the letter "M." That no confusion might arise the card enclosed in the bottle was of a different colour from

others, and addressed to the Secretary to the Meteorological Commission. The second set of bottles were set adrift from the Government vessel at the various places at which it happened to be while engaged in marine investigations.

Many more bottles than those here recorded have now been returned, but for the sake of clearness the results of those set off between May, 1899, when the work began, and May, 1901, and received up to this date,* are here recorded in the form of a preliminary report.

It is not intended, therefore, even if this were at the present stage advisable, to do little more than record the results, and bring them together in a form which can readily be comprehended.

The accompanying tables and chart show details as to the time, localities, etc., in connection with the bottles which were recovered.

The interval between the casting adrift and landing of the bottle is, of course, not indicated by the difference between the dates, nor the number of miles drifted by the distance between the localities. The distance drifted, therefore, is taken to be approximately the shortest, and may be considered as the minimum; the time is necessarily the maximum (in one case where the bottle was found at sea, the actual time), and consequently the rate of speed given in the last column is the minimum.

The direction and force of wind when the bottles were cast adrift is also given.

A few of the most striking courses taken by the bottles may be noted. We find in the region west of the meridian of Cape Point evidence of a current going northwards, with an inset towards the coast in the neighbourhood of Saldanha Bay, the latter fact being of special significance in connection with the well-known dangerous character of this region for navigation. The existence of this current is well known to navigators, and is well marked, especially during south-east winds. Another fact, which does not seem to so well established, however, is perhaps indicated by the course of bottles Nos. 150, 149, 491, and 359. These point to the existence of a cross current towards Robben Island. The recent disaster to one of the mail boats, the "Tantallon Castle," while in a fog, and steering a course calculated to carry her past Robben Island on the west side, would apparently be explained by such an inset current towards the land. The courses of these bottles seem to indicate a fact well worthy of a fuller investigation from its purely practical aspect.

Bottle No. 296 is one of the most interesting. It was set off on the 11th June, 1900, 26½ miles west of Cape Point during a

*16th December, 1901.

slight breeze from the west-south-west, and was found about a year afterwards (14th July, 1901) by Mr. M. J. Oliveira, a Customs House Officer, on the coast of Pernambuco, South America, having drifted a distance of more than 3,000 miles in this time, or at the rate of over eight miles a day. Its great distance from land had doubtless kept it clear of the South African coast until it got into the South Atlantic current, from whence it probably was carried with the North Equatorial current to the cost of South America.

That a drifting object, say, a log of wood or trunk of a tree, could be carried in such a comparatively short time from the coast of South Africa to that of South America is a fact which may throw some light on the geographical distribution of some animals. The distribution of such a form as *Peripatus*, for instance, could be accounted for on other grounds than those generally advanced, viz., the survival in widely separated regions of a form once universal. In the belief of my friend, Dr. Purcell, whom I have consulted, and who is well qualified to express an opinion on the subject, it is quite possible that this animal could survive such a journey, and from its habits is not unlikely to be occasionally carried out to sea with the drift wood from the rivers of South Africa. What is possible in a land form, such as this, is of course much more so in the case of floating marine forms which might be able to survive the various changes of temperature experienced in the different regions traversed. We have shown reasons for believing that the Agulhas Stream from the Indian Ocean reaches the region where the bottle in question was set adrift, and from which it was carried to a region within ten degrees of the Equator, where there are known to be currents passing into the northern hemisphere.

Nos. 161 and 164 are of interest, as they were cast adrift within a comparatively short distance (about two miles), and time (three hours) of each other, and were found at localities about one hundred miles apart. No. 161 was put overboard at 8.25 a.m., when there was no wind; No. 164 at 11.15 a.m., when a very slight north-west wind had sprung up. Apparently, the explanation is that by being about two miles further from the shore at the start No. 164 was able to clear the projecting part of the west coast. Any advantage to be gained by the north-west breeze in clearing the coast would, of course, be gained by No. 164. That this may not, however, be the explanation is demonstrated by the course of bottles Nos. 149 and 150, which were put over at the same time $1\frac{1}{2}$ miles off Lion's Head, and found on the shore near Table Bay, about three miles apart. (Compare also Nos. 374, 405, 453, 461, 465, and 573, and the numbers immediately following each of them.)

Passing to the region east of the meridian of Cape Point, we observe indications of a decided inset into False Bay, many of the recovered bottles put away off this region having been found in the Bay. No. 174 M is, apparently, an exception, but it is not impossible that this also circled round the Bay before being carried further eastwards.

Outside of these, however, one bottle, No. 108, was carried round Cape Point, and was found near Saldanha Bay. This is of special interest, as affording some evidence that the warm Agulhas current flows at least occasionally round Cape Point and up to the West Coast as a *surface* current. It was thrown off 14½ miles south by west off Cape Hangklip on the 8th December, 1899, and was found about thirteen days later at Saldanha Bay. In this instance, the only such occurrence, it was picked up in the water, so that it probably went at the rate of about nine miles per day. When sent off there was a fairly strong westerly breeze. During the fourteen days which it took to complete the journey (118 miles) the wind, as ascertained at Cape Agulhas, Cape Point, and at the Royal Observatory by the Meteorological Commission, was as follows:—

Date.	Cape Agulhas.		Cape Point.		Royal Observatory.	
Dec., 1899.	Direction.	Force.	Direction.	Force.	Direction.	Force.
8th	Calm.	—	W.	2	S.	0
9th	W.	2	S.W.	2	S.S.E.	2
10th	S.W.	2	W.	2	Calm.	—
11th	N.W.	5	N.W.	6	N.N.W.	3
12th	W.	7	S.W.	5	W.	1
13th	W.	5	N.W.	5	N.W.	3
14th	S.E.	2	S.E.	2	S.	3
15th	S.E.	5	S.E.	6	S.	1
16th	N.W.	1	Calm.	—	S.S.E.	0
17th	S.E.	2	S.E.	5	S.	0
18th	S.W.	6	W.	5	W.N.W.	2
19th	S.W.	3	S.W.	2	S.	1
20th	S.E.	2	S.E.	2	S.	3
21st	S.E.	1	S.E.	6	S.S.W.	3

These observations, for a copy of which I am indebted to Mr. C. Stewart, B.Sc., Secretary to the Meteorological Commission, may be taken to fairly represent the prevailing direction and force of wind over the region through which the bottle passed between the 8th and 21st, the period of its drifting, and it will be seen at a glance that the direction, if wholly determined by the wind, would be an easterly, rather than a westerly one. When the bottle was dropped overboard there was a west by

north wind, force 3, and for six days afterwards the wind was westerly at Cape Point, so that we cannot but conclude that it is highly probably the course of the bottle round the Cape Peninsula is to be attributed to a current passing round that point from the east, against the wind.

The course of this bottle is of further interest in connection with a series of temperatures taken off the Cape Peninsula, where an unexpectedly high surface temperature (69°9) was found, being higher than any of the daily observations in False Bay or Table Bay during the three years 1898-1900. This was supposed to indicate the presence of the warm Agulhas current in the region as a *surface* current, and the course of this bottle gives additional evidence in favour of this interpretation.

At the region immediately off Cape Agulhas there seems to be a less definite set of the course of the drift bottles than anywhere else. As we proceed eastwards, however, there is a decided tendency towards the east off Cape Infanta and Cape Vacca, and this tendency is apparent along the whole of the remainder of the south coast up to Cape Recife, being specially marked in the case of bottles which travel long distances.

The course of Nos. 316 and 318 are peculiar. They were put into the sea at places only about eight miles apart, and at an interval of one hour and twenty minutes, and yet, apparently, took quite opposite directions, the one being found at Bredasdorp, west of Cape Agulhas, and the other at Plettenberg Bay.

The inset into Mossel Bay and Plettenberg Bay is to be noted here, and may be compared with the inset into False Bay and Table Bay. Nos. 374 and 375 were put over at the same time off Cape Infanta, and were found at Mossel Bay, one mile apart.

Any negative evidence afforded by drift bottles put away and not returned is perhaps of doubtful value, but the following short statement of the total numbers set adrift is appended as a record, which may prove of utility in further work:—

SUMMARY OF BOTTLES SET ADRIFT.

1.—From the Union-Castle Mail Steamship Company's steamers on voyages between Cape Town and Natal, from 22nd December, 1900, to 25th May, 1901.

These bottles were supplied in sets of 28, two bottles being put over in the vicinity of each of the following localities: (1) Mouille Point; (2) Hout Bay; (3) Cape Point; (4) Cape Hangklip; (5) Danger Point; (6) Cape Agulhas; (7) Cape

Infanta; (8) Cape St. Blaize; (9) Knysna; (10) Cape St. Francis; (11) Cape Recife; (12) East London; (13) Port St. John's; and (14) Port Natal. The bottles containing cards with odd numbers were weighted, so as to become submerged. None of these have as yet been returned, and the method has since been discontinued.

Nos. 1 M.—28 M. December 22nd—28th, 1900. From R.M.S. "Scot," Captain T. J. Bremner. Nos. 14 M, 20 M, and 28 M returned.

Nos. 29 M—56 M. January 19th—February 3rd, 1901. From R.M.S. "Norham Castle," Captain R. E. H. Becher. Four returned Nos. 34 M, 36 M, 40 M, and 50 M

Nos. 57 M—84 M. March 14th—20th. From R.M.S. "Dunottar Castle," Captain H. Rigby. No. 68 M returned.

Nos. 85 M—112 M. March 30th—April 14th. From R.M.S. "Briton," Captain E. J. Griffin, Nos. 92 M and 98 M returned. The former, put away 12 miles south of Cape Hangklip, was found at Muizenberg about three days later, having travelled at the rate of over 10½ miles a day.

Nos. 113 M—140 M. April 13th—19th. From R.M.S. "Kinfauns Castle," Captain R. Duncan. None returned.

Nos. 141 M—168 M. April 27th—May 12th. From R.M.S. "Norman," Captain R. Reynolds. No. 164 M returned.

Nos. 169 M—196 M. May 11th—19th. From R.M.S. "Braemar Castle," Captain J. W. Creaghe. No. 174 M, cast off 8 miles S.S.W. of Cape Point, was found on the beach at Hawston, having drifted eastwards a distance of 31 miles at a speed of more than 18 miles a day.

Nos. 197 M—224 M. Sent to Captain H. Rigby, R.M.S. "Dunottar Castle," on 25th May, 1901. No particulars received, and none of the bottles have been returned.

2.—From the Government Trawler, "Pieter Faure," from 3rd May, 1899, to 31st May, 1901:—

Nos. 1—56. May 3rd—5th, 1899: On a voyage from Cape Town to Mossel Bay, at intervals of one hour. Of the 56 cast away, No. 2 was returned

Nos. 57—75. June 9th—10th: Ditto. Of the 19, No. 70, from Anchorage, Struis Bay, was returned.

Nos. 76—98. June 14th—July 27th: Twenty-three set off from about two to five miles off Cape St. Blaize. None returned.

Nos. 99 and 100. There were no cards for these numbers.

Nos. 101—119. December 5th—9th: Nineteen, on a voyage from Cape Town to Mossel Bay. No. 108 found off Saldanha Bay. Nos. 116 and 119 in Mossel Bay.

Nos. 120—132. December 13th, 1899—February 1st, 1900: Thirteen, off Cape St. Blaize, two to six miles. Nos. 121, 125, 128, 131, and 132 found on beach, from Mossel Bay east to Zwart River.

Nos. 133—150. February 2nd and 3rd: On a voyage between Mossel Bay and Cape Town. Of the eighteen put away, four were returned, No. 138 from Fish Hoek, No. 145 from Saldanha Bay, Nos. 149 and 150 from Blueberg Beach.

Nos. 151—275. March 5th—May 4th: One hundred and twenty-five, west and south of Cape Peninsula, 2 to 75 miles off shore. Of these, 3 out of 14, put off on March 6th, within, 12 miles of Lion's Head, were returned, two from near Saldanha Bay and one from further north. Of the 51 put off west of the Meridian of Cape Point, at a greater distance from shore, none were returned. There were southerly and northerly winds at this time. Of the few (6), however which were put off about the same time east of the meridian of Cape Point, one was carried into False Bay (No. 263), the most easterly one. Taken by itself this fact might be of little weight, but along with other observations it would seem it gives at any rate a provisional locality where the Agulhas current branches off to the right into False Bay, and to the left round the Peninsula to proceed up the west coast. The course of bottles Nos. 263 and 108 may be glanced at on the accompanying chart to illustrate what is meant, and perhaps as additional evidence.

Nos. 276—283. May 25th—26th: Eight set off on west coast. One, No. 276, sent off near Vondeling Island, was found four days later further south, nearly opposite Dassen Island. A north wind (force 3) was blowing at the time it was cast away, though on the following day the wind was southerly. This is the only one in this region which has taken a southerly direction.

Nos. 284—301. June 2nd—12th: Eighteen put away off Cape Point. One (No. 289), driven on shore by south-west wind from off Buffels Bay to Smitswinkel Bay. Eight were put off from 22 to 35 miles in a westerly direction from Cape Point. Of these, one (No. 296), was returned from Pernambuco.

Nos. 302—353. June 23rd—July 21st: 52 put off in region between Cape Agulhas and Izervark Point. Of the 6 returned, 5 went in an easterly direction to some considerable distance, but one went to the west in an opposite direction.

Nos. 354—361. July 21st—24th: Eight, between Cape Agulhas and Cape Town. One (No. 359) sent off with strong south wind, was carried from off Cape Point to Table Bay.

Nos. 362—372. August 9th—10th: Eleven, between Cape Town and Cape Agulhas. One (No. 364) drifted a short dis-

tance southerly on west of Cape Peninsula, and one (No. 371) eastwards, an exceptional direction here, past Danger Point.

Nos. 373—392. August 10th—17th : Twenty, between Cape Agulhas and Cape St. Blaize. Two (Nos. 374 and 375) recovered.

Nos. 393—406. August 17th—September 7th: Fourteen put off near Cape St. Blaize. Five got back, viz.: Three put off 8 to 10 miles off Cape St. Blaize carried far to eastwards, two to near Knysna, and one to Cape Recife; two, only 4 miles off, carried into Mossel Bay. From this and other evidence there seems to be an inset round Cape St. Blaize eastwards into Mossel Bay, but further from this point a current eastwards.

Nos. 407—474. September 12th—October 18th: Sixty-eight, between Cape St. Blaize and Plettenberg Bay. Fifteen returned, carried no great distance along the coast, about equally in a westerly and easterly direction.

Nos. 475—490. October 22nd—November 8th: Cape St. Blaize to Cape Town. Of the sixteen cast away, Nos. 475 and 481 got back, the former indicating an inset into Mossel Bay, a short distance off Cape St. Blaize, and the latter a general easterly trend off Cape Infanta.

Nos. 491—521. December 6th—10th: Cape Town to Natal. Of the 31 put away, 5 got back, No. 491 showing inset into Table Bay, No. 498 showing westerly current into Struis Bay (c.f. Admiralty chart), No. 507 showing westerly current from Cape Recife, No. 511 showing westerly current from East London, No. 521 showing current in opposite direction, northwards, from Cape Natal.

Nos. 522—581 December 13th, 1900—May 31st, 1901 : Off the Natal coast. Of 60 put away 5 were returned. No. 522 was put off three days after No. 521, but was carried in the same northerly direction, though not so far. No. 539 was put off at Noon, 3 miles off the shore, and was found at 5 o'clock of the same day about four miles further up the coast, and must have travelled at a speed of more than 19 miles a day. Nos. 573 and 574, put off together, two miles off the Umzimbaza River, were found five and a half hours afterwards, about five miles southwards of that point, and within a few yards of each other, having drifted at the rate of over 21½ miles per day, a record speed, so far as these investigations are concerned. No. 570 is of quite a different nature, having travelled southwards the great distance of 386 miles.

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Drift Bottles Sent Off from the Mail Steamers of the Union-Castle Coy. and Returned.

Ref. No.	PUT INTO THE SEA.							RECOVERED.			Interval	Estimated Distance in Miles	Rate per Day in Miles
	Date	Time	Name of Vessel	Captain	Locality	Wind		Date	Time	Locality			
						Direction	Force						
											D.H.M.		
14 M	23.12.00	6.45 a.m.	R.M.S. Scot.. ..	T. J. Bremner..	Cape Infanta, N., 12 miles	W.S.W.	6	5.1.01	..	Izervarkfontein, Riversdale	13 0 0	43	3·3
20 M	23.12.00	11.15 p.m.	„	„ ..	Cape St. Francis, N. 10 miles	S.W.	2—3	8.1.01	..	Near Fish Point Light House	16 0 0	127	7·9
28 M	28.12.00	11,30 a.m.	„	„ ..	Port Natal, W. 1 mile	E.N.E.	4—5	1.1.01	..	About 4 miles from the Port	4 0 0	4	1·
34 M	19.1.01	9.55 „	R.M.S. Norham Castle	R. E. H. Becher	Cape Point, N.E. x E. ½ E., 4 miles	W.N.W.	7	20.2 01	12.30 p.m.	Between Cape of Good Hope and Cape Point	1 2 35	6	5·4
36 M	19.1.01	11.7 „	„	„ ..	Cape Hangklip, N.E. x E. ½ E., 10 miles	W.N.W.	7	28.1.01	10.30 a.m.	Between Somerset Strand and Gordon's Bay	8 23 23	23	2·5
40 M	19.1.01	3.52 p.m.	„	„ ..	Cape Agulhas, N E. ½ N., 5 miles	N.W.	6	22.1.01	2 p.m.	Arniston Downs, Bredasdorp	2 22 8	22	7·5
50 M	20.1.01	12.45 „	„	„ ..	Cape Recife, N. 3 miles	W.	8	26.1.01	10 a.m.	On shore between St Croix and Bird Islands	5 21 15	24	4·
68 M	15.3.01	?	R.M.S. Dunottar Castle	H. Rigby ..	Cape Agulhas, N. 5 miles	?	..	22.3.01	..	Brakfontein, near L'Agulhas	7 0 0	9	1·2
92 M	30.3.01	1.45 p.m.	R.M.S. Briton ..	E. J. Griffin ..	Cape Hangklip, N.12 miles	W.N.W.	2	2.4.01	6 p.m.	Muizenberg ..	3 4 15	34	10·7
98 M	30.3.01	8.47 „	„	„	Cape Infanta, N. 20 miles	Variable	0—2	4.4.01	11.45 a.m.	Port Beaufort ..	4 14 58	24	5·1
164 M	1.5.01	8.45 a.m.	R.M.S. Norman ..	R. Reynolds ..	East London, W. 1·7 miles	W.N.W.	5	2.5.01	..	Between Nahoon and Gouwlie Rivs.	1 0 0	8	8·
174 M	11.5.01	8.26 p.m.	R.M.S. Braemar Castle	J. W. Greaghe..	Cape Point, N.N.E. 8 miles	N.N.W.	6	13.5.01	1 p.m.	Hawston Beach, Caledon	1 16 34	31	18·3

Drift Bottles Sent Off from Government Steam Trawler *Pieter Faure* and Returned.

Ref. No.	PUT INTO THE SEA. Date	Time	Locality	Wind Direction	Wind Force	RECOVERED. Date	Time	Locality	Interval	Estimated Distance in Miles	Rate per Day in Miles
									D. H. M.		
2	3.5.99	11.30 a.m.	Lat. 34° 0′ 30″. Long. 18° 18′ 30″ E. ..	Calm	..	5.5.99	6 a.m.	Nord Hoek Strand	1 18 30	7	3·9
70	10.6.99	7.35 „	Anchorage, Struis Bay,.. ..	„	..	11.6.99	2.45 p.m.	Struis Bay	1 7 10	1	·7
108	8.12.99	5.30 p.m.	Cape Hangklip, N. x E., 14½ miles ..	W. x N.	3	21.12.99	3 „	Off Saldanha Bay	12 21 30	118	9·1
116	9.12.99	11 a.m.	Izervark Point, N.E. ¾ E., 12 „ ..	Calm	..	22.12.99	3 „	3 Miles east of Brak River ..	13 4 0	50	3·7
119	9.12.99	4.5 p.m.	Anchorage, Mossel Bay..	S.E.	1	10.12.99	7 a.m.	Mossel Bay	14 55	½	·8
*121	13.12.99	2.15 „	Cape St. Blaize, W. x N., 2 miles ..	W.	5	16.12.99	..	Near Mossel Bay	3 0 0	6	2·
*125	7.1.00	8.30 a.m.	Anchorage, Mossel Bay..	S.E.	2	7.1.00	3.15 p.m.	Voor Baai (Mossel Bay) ..	6 45	½	1·7
128	16.1.00	2 p.m.	Cape St. Blaize, W. x S., 5 miles.. ..	W.S.W.	1	18.1.00	7.30 a.m.	Mouth of Hartenbosch River Mossel Bay	1 17 30	8	4·6
*131	29.1.00	1.30 „	„ „ W. ½ N., 5¼ „	W.	3	25.8.00	..	Near mouth of Zwart River ..	208 0 0	27	·1
132	1.2.00	1.15 „	„ „ W. ¾ N., 6¼ „	S.E.	2	17.2.00	12.30 p.m.	Mossel Bay..	15 23 15	7	·4
138	2.2.00	6 „	Cape Agulhas, N.W. ½ N., 11½ „	S.W.	2	23.12.00	1 „	Fish Hoek, near Simon's Bay ..	323 19 0	103	·3
145	3.2.00	8 a.m.	Off Slangkop Point, 5½ miles	S. x W.	2	13.2.00	..	Schryvers Hoek, Saldanha Bay ..	10 0 0	58	5·8
149	3.2.00	10.20 „	Off Lion's Head, 1½ miles	Calm	..	4.2.00	10.30 a.m.	Riet Vlei Mouth	1 0 10	8	7·9
150	3.2.00	10.20 „	„ „ „	„	..	4.2.00	1.15 p.m.	Near entrance to Blaauwberg Village	1 2 55	9	8·
154	6.3.00	7.15 „	„ 4¾ „	„	..	27.3.00	..	North Bay (Saldanha Bay) ..	21 0 0	58	2·7
161	6.3.00	8.25 „	Lion's Head, S.E. ¼ S., 11 miles	„	..	10.3.00	..	Schryvers Hoek, Saldanha Bay ..	4 0 0	40	10·
164	6.3.00	11.15 „	„ S.E. ¼ E., 12½ „	N.W.	0·5	30.4.00	8 a.m.	Waterbak, Van Rynsdorp ..	54 20 45	143	2·6
263	26.4.00	11.30 „	Nasco de Gama Pk., N. 37° W., 8 miles ..	N.	5	29.4.00	noon	Kalk Bay Beach	3 0 30	19	6·2
276	25.5.00	10.30 „	Vondeling Island (Saldanha Bay), N. ¼ W. 3½	N.	3	29.5.00	..	Rondeberg, near Darling ..	4 0 0	15	3·7
289	2.6.00	2.45 p.m.	Off Buffels Bay, 2 miles	S.W.	1	10.6.00	..	Smitswinkel Bay, near Simon's Bay	8 0 0	4	·5
296	11.6.00	2.45 „	Cape Pt. Light House, East, 26½ miles ..	W.S.W.	2	14.7.01	..	Pernambuco, South America ..	398 0 0	3,400	8·5
307	23.6.00	10.30 a.m.	Izervark Point, N. x E. ¾ E., 6 miles ..	Calm	..	19.8.00	..	Geelhoutboom, Humansdorp ..	57 0 0	150	2·6
308	23.6.00	11.30 „	Bull Point, N.W. x N. ½ N., 6½ miles ..	„	..	8.8.00	..	Zitsikamma River Mouth ..	46 0 0	130	2·8
316	29.6.00	3.45 p.m.	Cape Barracouta, N.E., 6½ miles	E.S.E.	2	6.1.01	..	Buffelsjagd, Elim, Bredasdorp ..	191 0 0	92	·4
318	29.6.00	5.5 „	Morris Point, N. x E., 9 miles	„	2	4.11.00	noon	Matjesfontein, Plettenberg Bay ..	127 18 5	115	·9
324	2.7.00	10.20 a.m.	Cape St. Blaze, N.N.E., 2½ miles	W.	1	16.10.00	„	Plettenberg Bay	106 1 40	66	·6
351	21.7.00	1 p.m.	Cape Infanta, E. ½ N., 15½ miles	S.W.	1	12.8.00	„	Kaffir Kuils River Mouth, Still Bay	21 23 0	47	2·1
359	24.7.00	10.55 a.m.	Cape Point, S.E. x E., 9 miles	S.	6	7.9.00	..	Between Melkbosch and Blaauwberg	45 0 0	38	·8
364	9 8.00	12.50 p.m.	Off Slangkop Point, 2 miles	W.N.W.	1	16.12.01	noon	Oliphants Bosch	493 23 10	7	·01
371	9.8.00	7.45 „	Cape Hangklip, North, 15 miles	S.S.E.	1	11.8.00	..	Hazel Kraal, Breadsdorp ..	2 0 0	26	13·
374	13.8.00	8.10 a.m.	Cape Infanta, N.E. ¼ N., 3 miles	W.N.W.	2	8.9.00	5 p.m.	Voor Baai (Mossel Bay) ..	26 8 50	83	3·1
375	„	„ „	„ „	„	2	8.9.00	3.30 „	„ „ ..	26 7 20	83	3·1
395	27.8.00	5.30 p.m.	Cape St. Blaize, N.N.E., 8 miles.. ..	S.W.	1	22.9.00	..	Between Gouwkamma and Zwart River Mouth, Knysna	26 0 0	35	1·3
398	28.8.00	2.10 „	„ N.W. x W. ¾ W., 9 miles ..	S.	1	17.9.00	6 a.m.	Buffalo Bay	19 15 50	33	1·6
399	30.8.00	„ „	„ W. x N. ½ N., 10½ „ ..	W.S.W.	2	29.9.00	3 p.m.	Cape Recife	30 0 50	174	5·7
405	7.9.00	12.50 „	„ N.W. x W. ½ W., 4 „ ..	„	2	14.9.00	..	Great Break River Mouth ..	7 0 0	9	1·2

Drift Bottles Sent Off from Government Steam Trawler *Pieter Faure* and Returned.—*Continued.*

Ref. No.	PUT INTO THE SEA. Date	Time	Locality	Wind Direction	Wind Force	RECOVERED. Date	Time	Locality	Interval	Estimated Distance in Miles	Rate per Day in Miles
406	7.9.00	12.50 p.m.	Cape St. Blaize, N.W. x W. ½ W., 4 miles ..	W.S.W.	2	8.9.00	..	Two miles from Mossel Bay ..	1 0 0	8	8·
419	17.9.00	3 „	„ N. ½ E., 5½ „ ..	S.	1	30.9.00	10 a.m.	Great Brak River Mouth ..	12 19 0	13	1·
422	18.9.00	2.50 „	„ N. 15° W., 7 „ ..	S.S.E.	1	2.11.00	3 p.m.	Zwart Vlei, George	45 0 10	29	·6
425	20.9.00	3 „	„ N.N.W., 5 „ ..	W.S.W.	3	28.9.00	noon	„ „	7 21 0	23	2·9
431	3.10.00	9.15 a.m.	Gayang River Mouth, N.W. ½ N., 9 „ ..	N.	1	27.10.00	..	Falcomb, Knysna	24 0 0	25	1·
433	„	11.35 „	„ „ N. ¾ W., 18 „ ..	W.S.W.	2	7.11.00	10 a.m.	Between Keiskamma River and Zwart Vlei	34 22 25	18	·5
445	10.10.00	7.30 „	Walker Point, E. x S., 5 miles	W. x N.	2	22.10.00	9 „	Between Touws River and Zwart Vlei	12 1 30	14	1·1
450	11.10.00	11.50 „	Knysna Heads, N.E. ¾ E., 12½ miles ..	W.S.W.	1	19.10.00	..	Cape Seal, Plettenberg Bay ..	8 0 0	25	3·1
453	15.10.00	11.25 „	Malgat River, N. x W. ¼ W., 6½ „ ..	S.W.	1	18.10.00	7 p.m.	Voor Baai (Mossel Bay)	3 7 35	45	13·5
454	„	„ „	„ „ 6½ „ ..	„	1	18.10.00	7 „	„ „			
460	„	3.10 p.m.	Walker Point, E. x S., 5 miles	Calm	..	23.10.00	..	Near Flesh Bay	8 0 0	50	6·2
461	17.10.00	6.45 a.m.	Plettenberg Bay, Cape Seal, S.W. x W., 2¼ miles	N.	0·5	26.10.00	..	Between Keurbooms and Matjes River	9 0 0	10	1·1
462	„	„ „	„ „ „ „ 2¼ „	„	0·5	26.10.00	..	Within 300 yards of No. 461			
465	„	9.40 „	Cape Seal, E. x S. ½ S., 8 miles	N.W.	0·5	22.10.00	..	Mossel Bay	5 0 0	58	11·6
466	„	„ „	„ „ 8 „	„	0·5	22.10.00	..	„			
474	18.10.00	4.20 p.m.	Malgat River Mouth, N. x W. ¼ W., 6½ miles	S.W.	0·5	27.10.00	3 p.m.	Harolds Bay, George	8 22 40	34	3·8
*475	22.10.00	10 a.m.	Cape St. Blaize, North, 5 miles	S.S.W.	1	27.10.00	8 a.m.	Between Little Brak and Hartenbosch Rivers	4 22 0	11	2·2
481	8.11.00	6.5 „	Cape Infanta, N.E. ¾ N., 17¾ miles	S.W.	1	17.1.01	..	Buffels Hoek, Riversdale ..	70 0 0	57	·8
491	6.12.00	6.30 „	Green Point Light House, South, 1 mile ..	W.N.W.	1	20.1.01	5 p.m.	Melkbosch, Blaauwberg ..	45 10 30	7	·1
498	7.12.00	4 „	Cape Infanta, N. x E., 15 miles	N.W.	2	15.12.00	noon	Wagenhuis Krantz, Bredasdorp ..	8 8 0	36	4·3
507	8.12.00	noon	Cape Recife, N.W. ¾ W., 5¼ miles	W. x N.	1	1.5.01	..	Zeekoe River Mouth, Humansdorp	144 0 0	47	·3
511	9.12.00	4.15 a.m.	East London, E.N.E. (D.R.), 8 miles ..	N.N.W.	1	14.12.00	..	Kasouga, Bathurst	5 0 0	70	14·
521	10.12.00	8 p.m.	Cape Natal Light House, N.E. ¼ N., 10 miles	N.E.	4	9.1.01	..	15 miles south of St. Lucia Bay, Zululand	30 0 0	115	3·8
522	13.12.00	8 a.m.	„ „ N.W., 4 „	E.N.E.	1	16.12.00	10 a.m.	Tongaat River Mouth, Natal ..	3 2 0	19	6·1
539	14.1.01	noon	Morewood Cove, N. x W., 3 miles	E.S.E.	1	14.1.01	5 p.m.	Umhlali, Natal, about 1½ miles N. of Morewood Cove	5 0	4	19·2
	14.3.01	„	Port Shepstone, N.E. x N. ¼ N., 16 miles ..	E.N.E.	1	3.8.01	noon	Zitzikamma Point, Humansdorp ..	142 0 0	386	2·7
	15.3.01	„	Off Umzimbaza River Mouth, 2 „ ..	E.	2	15.3.01	5.30 p.m.	One mile south of Umkomaas River	5 30	5	21·8
	„	„	„ „ 2 „ ..	„	2	15.3.01	„	„ „ „			

* Course marked on Chart but numbers not inserted.

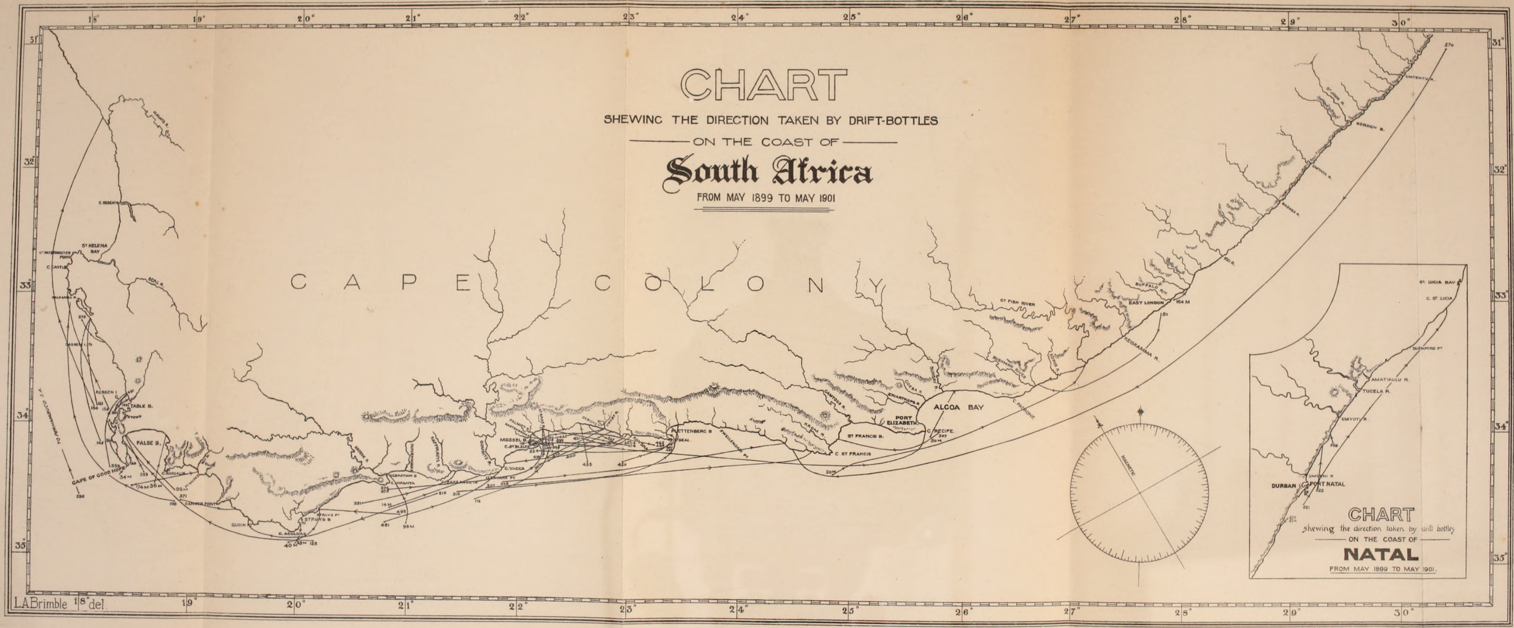
CHART
SHEWINC THE DIRECTION TAKEN BY DRIFT-BOTTLES
ON THE COAST OF
South Africa
FROM MAY 1899 TO MAY 1901
CAPE COLONY
ALCOA BAY
PORT ELIZABETH
EAST LONDON
MOSSEL B.
FALSE B.
TABLE B.
CAPE OF GOOD HOPE
C. AGULHAS
C. ST FRANCIS
ST FRANCIS B.
C. RECIFE
MAGNETIC
CHART
shewing the direction taken by drift bottles
ON THE COAST OF
NATAL
FROM MAY 1899 TO MAY 1901.
DURBAN
PORT NATAL
L.A.Brimble del.