REPORT OF MEMBERS LOST AND MEMBERS RECEIVED INTO THE SOCIETY FOR YEAR; AND STATUS OF THE MEMBERSHIP OF THE SOCIETY, MAY 28, 1936.

We have members as follows:

Honorary	4
Active	349
Individual Associate	11
Corporation Associate	25
Total Membership May 28th, 1936	389

During the 1935-1936 year, we have received into the Society new members as follows:

Active	60
Individual Associate	5
Corporation Associate	5
Total Members Received	70

During the same period, we have lost members as follows:

By Resignation and Non-Payment of Dues	35
Total Membership of the Society May 28th, 1936	389
Total Membership of the Society, May 23rd, 1935	354
Net Gain of Members for year ending May 28th, 1936	35

Mr. President:

In submitting the foregoing report, I ask that an Auditing Committee be appointed to make a thorough audit of the accounts of the Secretary-Treasurer, and report back to the Society before the adjournment of our meeting, May 29th, 1936.

J. C. P. HELM,
Secretary and Treasurer.

WHALE OIL AND WHALE TRIBES

By JAKOB LUND
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DIFFERENT species of whales are spread in all oceans. The composition of the oils varies accordnig to the kind of the whale, its food and feeding conditions.

The constants of the whale oils are thus of great interest, as they furnish an insight into the biochemistry of the whales and allow certain conclusions regarding the question of the splitting of whales in different tribes.

The general influence of the food is known from feeding experiments, especially on rats. When these are fed diets containing a special fat, they will deposit fat with a similar iodine value. Recently it has been shown that rats fed on prawns deposited an oil similar to whale oil. This influence of the food of course holds good under natural conditions, too, in a less marked way. Thus the whale tribes, living under different feeding conditions in the different oceans, may produce oils with different iodine values, supposing their migrations are regular, and the same tribes always revert to their special feeding ground.

From the catch of the last 25 years I have collected a great number of whale oil analyses, from different species, different fields, from different parts of the whale and from fat and lean individuals.

The influence of feeding conditions is rather important and of a general nature, and may be discussed first. The investigations have shown that lean whales contain oils with low iodine values; for example, for a lean Antarctic blue whale about 100 in all parts of the animal. Fat blue whales such as female whales with a foetus, give oils with high iodine values, such as 120 to 130 in the blubber and flesh, and 140 in the inside fat. These figures are found by different investigators and I can confirm them from my own experience. In the fattening period the iodine value will increase, in the starving period it will decrease. This is a general feature in the biochemistry of marine animals. Thus winter herring oil has an iodine value of 125 against 150 in the fat summer herring.

The various species of the whales produce oils of different composition, and comparisons can only be drawn between oils of the same kind. The iodine values and saponification values of the best known whale oils of the northern and southern hemisphere are given below in table 1.

It will be seen that the tribes of the northern hemisphere give oils with low saponification values, evidently caused through the different food. The oils from the right whales have the highest iodine values, oils from humpbacks and sei whale have mean iodine values, and the lowest are on an average found in oil from blue and fin whales. Sperm oil and bottlenose oil represent liquid waxes and will not be considered.

The figures given above are average values from the catch, but it is necessary to emphasize that oils from different parts of the whale have different iodine values. This is shown in table 2, which

TABLE 2.

Oil from:	Iodine value
Outer blubber	116
Inner blubber	122
Inside fat	135
Meat	130
Bone	110
Tongue	105
Whole animal	118

TABLE I.

	Northern hemisphere		Southern hemisphere	
Whale Species	Sap. value	Iodine value	Sap. value	Iodine value
California grey right whale	189	150-160	194	150-160
Humpback	189	120-125	195	125-140
Sei whale	186	120-130	190	130-145
Fin whale	187	100-140	193	105-140
Blue whale	187	100-130	193	105-140

gives the average iodine values for the most common type of the Antarctic blue whale.

It will be seen that the iodine value of the blubber oil as a rule very nearly expresses the average iodine value of the oil from the whole animal.

These figures increase for all parts of the whale in the fattening period and decrease in the starving period. The greatest variations take place in the flesh oil and inside fat, while the blubber oil, the tongue and the bone oil are less subject to variations. The average yield in Antractic is about 90 barrels oil pr. blue whale in the first month of the season and 130 barrels in the last month. This fattening process causes the iodine value of a distinct herd on a limited ground to rise about 8 units, at most. Usually there is a difference of a few units between the oils from the first and the second half of a season.

The iodine values of average oils from different species and different hunting grounds will be given below.

The Humpback Oil

The stock of this animal in the northern ocean is small. A few seasons (June-September) at the coast of Greenland gave oils with the iodine value of 122, and the same figure was found in oil from humpbacks caught one season at the small Antilles. These figures indicate that a herd of humpbacks in the winter months migrate southwards from the Arctic Ocean along the east coast of America.

In the Antarctic the stock was at an earlier time very numerous, but the number is now reduced. In the winter time the animals leave for warmer waters and pass alongside the coasts of South Africa, South America and West Australia. From whaling stations on these coasts the humpbacks for many seasons were the object of whaling operations. The iodine values of the oils from the different grounds are collected in table 3.

TABLE 3.

Hunting ground	Season	Iodine value
Antarctic—		
(South Georgia)	1906-1912	135
(South Shetland)	1926–1930	135
East Africa	1914	140
West Africa	1922, 23, 26, 30	135
Brazil	1914	135
West Australia	1914, 1925	127
Indian Ocean	1935	127

It will be seen that the iodine values from the different fields of the Atlantic Ocean are practically constant, a proof of the migrations of the whale from South Georgia and South Shetland to the coasts of South Africa and South America. The mean figure of the iodine value is the same in the winter and summer time. This is quite natural, as the whale in the summer (October-April) passes the stages from lean to fat, and in the winter time from fat to lean. The average figure for the two seasons thus will be practically the same for the same herd.

The humpback oil from the Indian Ocean and West Australia has lower iodine values. The difference of 8 units is not casual, as it has been found for several seasons. This regular low iodine value proves that the stock of humpbacks migrating from the Indian Ocean consist of a special herd, different from the stock of the South Atlantic Ocean. The difference between the iodine values must be due to the different feeding conditions of the two oceans.

The Finwhale Oil

In the table 4 the analyses of finwhale oils from the northern hunting grounds are compiled. In the northern waters this specie of whale is almost exclusively caught, and the oils from the catch represent almost pure finwhale oil.

The oil from the south of Spain has the highest iodine value. This figure is definitely lower at the coast of Portugal and the north of Spain. The whales at the strait of Gibraltar therefore must have been a special tribe of the finwhales.

The whale oils from the west coast of Norway have the mean iodine value 118, from Færö Islands 125, and from the Hebrides 131. The rising tendency of the iodine value at these islands cannot be doubted, and in any case the whale stock here must contain herds not seeking the Norwegian waters. It is further evident that these herds do not migrate as far as Iceland or the Arctic, as the iodine value of oil from these grounds is much lower, about 106. The whale stock in the Arctic thus probably consists of special western herds migrating along the east coast of America. It is further evident from the iodine values that the fin whale stock of the northern hemisphere must consist of at least 4 or 5 different tribes.

TABLE 4.

Hunting Ground.	Season	Iodine value Min.	Max.	Average
Coast of Spain, South	1921, 22, 23, 24	131	140	135
Coast of Spain, North	1926, 27	120		120
Coast of Portugal	1927	121		121
Coast of Norway	1911, 17, 18, 24, 26, 27, 28, 29, 30	115	123	118
Coast of the Færö Islands	1920, 21, 23, 28, 29	122	128	125
Coast of the Hebrides	1925	131		131
The Arctic	1906, 20, 27, 29, 30	100	112	106
Newfoundland	1929, 30	105	108	106

Blue Whale Oil

The blue whale is mostly caught in the southern oceans, partly together with the finwhale. The following table 5 gives the average figures from the different land stations in the southern hemisphere.

The agreement between the iodine values of the oils from the different continental coasts and from the corresponding Arctic grounds is of such a nature that it confirms the theory of the migrations from the southern fields northwards to the coasts of Africa and America. It is further evident that the iodine value only to a small degree is affected by the season. It may be mentioned that the average iodine values include oils from different tribes, mostly with the iodine value of 112, but some oils reach the iodine value of 130. This will be seen from the following table 6 giving the iodine values from the

TABLE 5.

Hunting ground	Season	Average iodine value
Coast of:		
Ecuador	1926	116
Peru	1926	121
West Africa	1918, 24, 25, 27	125
South Africa	1914, 24, 27, 28, 29	119
South Georgia	1921-1930	115
South Shetlands	1921-1930	117

stations on South Georgia and the South Shetlands for ten seasons.

TABLE 6.

Season	South Georgia Iodine value Avge.	Max.	South Shetlands Iodine value Avge.	Max.
1921-1922....	112	127	118	135
1922-1923....	113	121	118	130
1923-1924....	114	126	118	135
1924-1925....	115	121	118	130
1925-1926....	109	116	113	124
1926-1927....	113	125	115	135
1927-1928....	119	126	118	140
1928-1929....	119	124	118	130
1929-1930....	115	120	118	128

For both grounds the average figure is practically the same in all years, but from different parts of the catch it is seen that there are upper and lower limits, indicating the presence of different tribes. This is especially the case at the South Shetlands in the latter part of the season, when oils with iodine values of 130 are produced.

In the later years the catch has been extended to all waters around the south Polar continent. These waters have been divided in four areas and the following table 7 gives the iodine values for the different grounds.

TABLE 7.

Hunting grounds, South of 60°	Season	Iodine value
Area 2. 70° west-0° ..	1930-35	112, 130
Area 3. 0°-70° east ..	1930-35	117 (123)
Area 4. 70°-130° east..	1930-35	108 (110)
Area 5. 130°-180° east..	1923-30	106 (108)

The table shows that the blue whale oil from the area 2, south of South Georgia, has an average iodine value of 112, and partly higher, up to 130. From the area 3, east of the Bouvet Island, the figure is 117, from area 4, east of Kerguelen, 108, and from the Ross Sea 106.

These figures indicate that three different tribes of the blue whale exist in the South Atlantic Ocean, and probably two in the Indian Ocean.

The whale oils from the two grounds in the Indian Ocean have remarkably lower iodine values than the oil from the South Atlantic. As mentioned before, the feeding conditions in the two oceans must be rather different.

A further conclusion, which can be drawn from the iodine values, is that the whale tribes in the oceans have regular migrations, as the iodine values of the oils of different areas in the opposite case, could not be constant from season to season.

The analytical investigations of whale oils thus have given interesting results, and this short summary will show the possibilities of drawing conclusions from oil analyses as well regarding the biochemistry of whales, as of other marine animals.

LITERATURE

Hvalraadets skrifter, No. 11, Oslo, 1935.
E. F. Heyerdahl. Hvalindustrien. Oslo, 1932.

Report of Revisions of Methods Committee

THE Revisions of Methods Committee found it necessary this year to have 28 new and revised pages printed at a cost of $97.50. In addition to the corrections and additions to the methods, in order that our members might be able to keep their methods up to date we inserted a checking list and chronological record showing the date of adoption, as far as possible, of the methods and from time to time each year this will be brought up to date. We also divided the index so that the Oil and Fat Methods and the Soap Methods indices follow the chapter on each subject, respectively.

The committee next year intends to incorporate the methods adopted on Sulphonated Oils, but the question of whether they should be included under the Soap Section or as a separate section has not been decided.

W. H. IRWIN,
Chairman.

Report of the Journal Committee: American Oil Chemists' Society*

Our Journal OIL & SOAP is now on a profitable basis to our publishers and the editorial matter can doubtless be expanded somewhat during the coming year provided we secure sufficient papers of the right quality.

The Journal Committee wishes again to bring to the attention of the membership that the Journal should not be dependent on our two meetings for all the editorial matter. What we need is more original papers, but it has been a difficult matter to get our members and others to contribute.

The Spring Meeting is, to a very large extent, given over to committee reports and, while these committee reports are of extreme importance to the society, a journal consisting largely of committee reports is not attractive to our membership. The committee should, therefore, like to ask more cooperation during the coming year for contributions of original papers.

W. H. IRWIN, Chairman,
T. C. LAW,
E. R. BARROW,
J. P. HARRIS,
H. P. TREVITHICK,
J. J. VOLLERTSEN,
A. F. SANCHEZ,
L. M. TOLMAN,
N. C. HAMNER.

*As presented at the spring meeting at New Orleans, May 28-29, 1935.