

PRELIMINARY RESULTS OF FISH EGG SURVEY IN THE GULF OF THAILAND

by

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ABSTRACT

Planktonic eggs probably of *Rastrelliger*, *Stolephorus*, *Trichiurus*, *Fistularia*, *Dussumieria* and several types of clupeoids are described from the Gulf of Thailand.

INTRODUCTION

As a continuation of the program on oceanographic study of the Gulf of Thailand, conducted by the ICA's* Naga Expedition, between 1960 and 1961, the Hydrographic Department of the Royal Thai Navy has carried on the program, the biological part of which was undertaken by the Department of Fisheries.

This article reports preliminary results of identification of pelagic fish eggs. They were collected at various locations in the Gulf during four cruises made by the oceanographic vessel of the Hydrographic Department, O.S. 2, between May and September 1961 (Map p. 17).

MATERIALS AND METHODS

Plankton was sampled at various locations illustrated in Fig. 1 by the 45 cm. Marutoku B plankton net with mesh aperture of 0.33 mm. Oblique tows were made at different depths. The collected samples were preserved in 4% formalin solution, and were sent to the Department of Fisheries for both qualitative and quantitative analyses.

At various stations a series of water samples from different depths were collected for the analysis of chemical properties.

The amount of plankton in each sample was determined using the displacement method. The fish eggs were sorted out, and attempts to identify them were made using two approaches:

- 1) By comparing the specimens with those described by Delsman (1921-1933).
- 2) By studying the morphological characteristics (size of egg, size of oil globule, nature of the yolk) of the eggs, from running ripe fish and comparing them with the specimens from the sea.

RESULTS AND DISCUSSIONS

1. *Rastrelliger* Type Eggs

The chub mackerel (*Rastrelliger* sp.) is one of the most important fish commercially caught in large quantity in the Gulf of Thailand. There are two species whose major characteristics are the same, namely *Rastrelliger neglectus* and *Rastrelliger kanagurta*.

Delsman (1921-33) described the eggs of *Scomber kanagurta* of the Java Sea, and this is assumed to be the same species as that of the Gulf. The diameters of the eggs of this species as reported by Delsman varied from 0.85 to 0.95 mm. The almost colorless oil globule which was found in the unsegmented yolk was approximately 0.21-0.24 mm. in diameter.

In this study, some of the eggs found in 20 stations in the Gulf may probably belong to those of the chub mackerel group. The egg diameters ranged from 0.72 to 0.90 mm. The unsegmented yolk had a large oil globule of approximately 0.20-0.25 mm. in diameter (Fig. 1).

* International Cooperation Administration

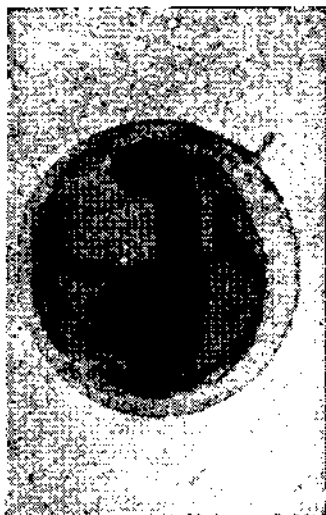


Fig. 1. The *Rastrelliger* egg (X 40)

II. The *Stolephorus* Type Egg

The eggs of *Stolephorus* spp. have peculiar characteristics being ellipsoidal with or without a terminal knob at the animal pole. The segmented yolk may or may not have an oil globule depending on certain species.

Delsman (*ibid.*) formulated an artificial key to identify the eggs of *Stolephorus* spp. :

1. Egg without oil globule and with a knob on the egg membrane
 - a. Longer variety.....
Stolephorus insularis
 - b. Shorter variety.....
Stolephorus indicus or
S. commersonii
2. Egg without a knob and without oil globule, or with a very small oil globule (diameter of 0.05 mm.)
 - a. Without oil.....
Stolephorus zollingeri
 - b. With a small, yellow oil globule ..
S. heterolobus
3. Egg without a knob, and with an oil globule 0.075-0.12 mm. in diameter.
 - a. Diameter of oil globule 0.07-0.08 mm *S. tri*
 - b. Diameter of oil globule 0.10-0.12 mm. *S. baganensis*

Five types of eggs which possessed the same characteristics as those of the *Stolephorus* spp. described by Delsman were found in this study. Fig. 2 shows the egg of the first type which may probably belong to *Stolephorus insularis*. The eggs with a terminal knob at the animal pole were 1.76-2.22 mm. in length, 0.63-0.80 mm. in breadth. They had no oil globule.

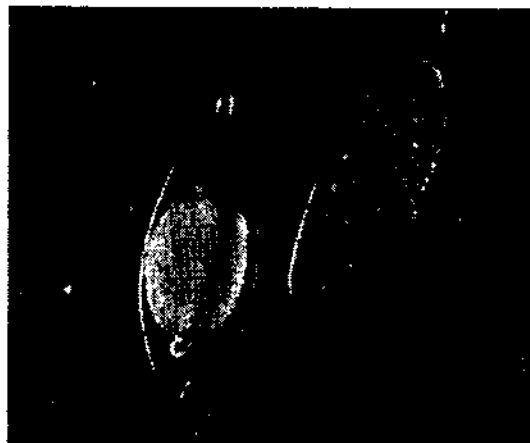


Fig. 2. *Stolephorus* (X 30)

Eggs which might be those of *Stolephorus zollingeri* were also discovered in the study (Fig. 3). They were 0.92-1.24 mm. in length and 0.43-0.55 mm. in breadth. These eggs had a terminal knob but no oil globule.

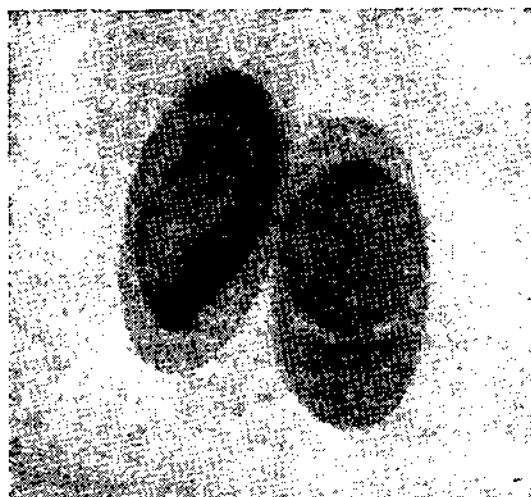


Fig. 3. *Stolephorus* egg (X 40)

Those which had the characteristics of *S. heterolobus* were also found in the samples. They were 1.04-1.28 mm. in length and 0.50-0.65 mm. in breadth (Fig. 4).



Fig. 4. *Stolephorus* egg (X 40)

Two more types were also discovered in the investigation. One of them was particularly long being 1.10-1.51 mm. in length and 0.49-0.74 mm. in breadth (Fig. 5). The oil globule was bigger than that illustrated in Fig. 4.



Fig. 5. *Stolephorus* egg (X 40)

The last type was the biggest of all those previously described, and without a knob. The eggs were 1.44-1.63 mm. in length and 0.7 mm. in breadth. The oil globule was 0.10-0.14 mm. in diameter (Fig. 6).



Fig. 6. *Stolephorus* (X 40)

The first two types were found off shore in the deeper part of the Gulf where the water was deeper than 24 meters. The last three types were found near estuaries not far from shore where the water was between 4 and 13 meters in depth.

III. *Dussumieria* Type Eggs

Two species of clupeoid fish in the Gulf of Thailand *Dussumieria hasseltii* and *D. acuta*, have been previously recorded (Suvatti, 1950). A sample of fully mature round herring was found in October 1961. These fish had eggs whose diameters ranged from 1.10 to 1.49 mm. The yolk of these eggs was segmented and contained 5-15 oil globules.

Some of the eggs in the plankton samples were found to have characteristics similar to those described by Delsman (1926) of the eggs of *D. hasseltii*. These eggs were 1.33 to 1.64 mm. in diameter, each having segmented yolk and small oil globule of about 0.16-0.18 mm. in diameter at the vegetative pole (Fig. 7).

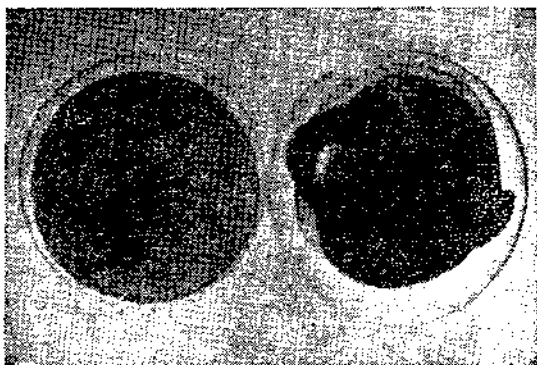


Fig. 7. *Dussumieria* egg (x 40)

The eggs which might belong to *Dussumieria* species were found in the western margin of the Gulf, in the water whose salinity was 32.01-32.15‰ and 14.5-56 meters in depth (Table I).

IV. "Clupea" Type Eggs

The egg of sardine is different from those of other marine fish eggs because of its very wide perivitelline space; the egg membrane is thin and is very easily broken, and the yolk is segmented with a small oil globule.

Ahlstrom (1950) described the egg of Pacific pilchard, *Sardinops caerulea*, as having a wide egg membrane with average diameter about 1.70 mm. The yellowish-brown yolk appears to be made up of a number of irregular cells, but it is composed of a large number of separate particles of yolk material

closely pressed together. There is a single oil globule, 0.16 mm. in diameter.

In this study five types of clupeoid fish egg were observed:

Type 1.

This type had segmented yolk, the egg membrane had a diameter of 1.30-1.45 mm., an oil globule was present, with diameter of 0.09-0.12 mm., averaging 0.10 mm. (Fig. 8).

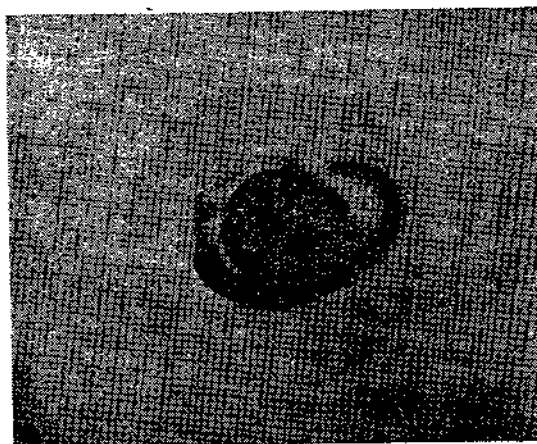


Fig. 8. The egg of "*Clupea*", type 1. (X 35)

Types 2 and 3.

These two types of eggs were similar in appearance; each had a small oil-globule, but the diameters varied. That of Type 2 was about 0.16-0.18 mm. and Type 3 was about 0.16-0.20 mm. The diameter of the egg also varied, Type 3 about 1.60-1.80 mm. The yolk of both types was unsegmented. (Fig. 9).

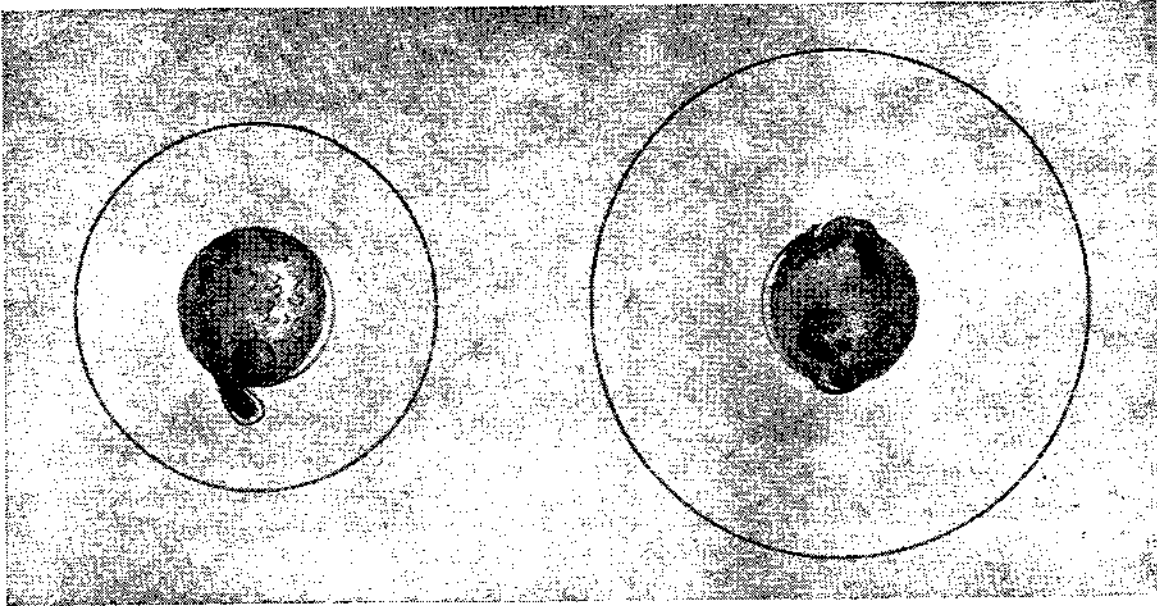


Fig. 9. The eggs of "*Clupea*", types 2 and 3 (X 40)

Type 2 eggs were found at six stations along the western margin of the Gulf whose depth was about 22-42 meters. However, Type 3 was found in considerable numbers at one station not far from the coast of Koh Pa-Ngun.

Type 4 had two membranes. The outer egg-membrane was very thin, of about 1.02-1.15 mm. in diameter and even easily broken. The yolk was segmented with a small oil globule of about 0.08-0.09 mm. diameter (Fig. 10). These eggs were collected on the east coast of Sichol district, Nakornsritamaraj province (Fig. 1) where the depth was about 125 meters.

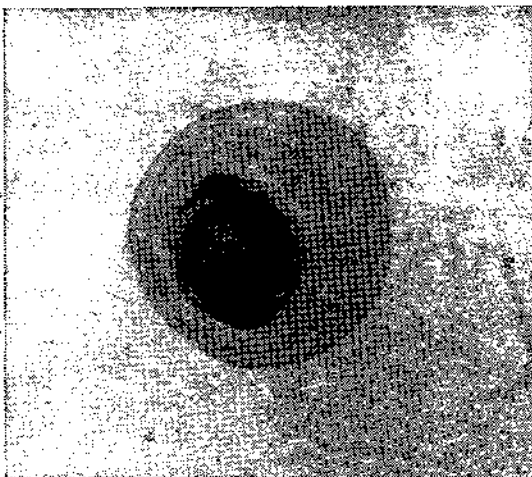


Fig. 10. The eggs of "*Clupea*", "Type 4" (X 35)

The characteristics of the "Type 5" (Fig. 11) had a wide perivitelline space with segmented yolk which is rather dull. The diameter of the egg-membrane was larger than that of the other types, ranging to about 2.5 mm. and was thick. At the vegetative pole there was a big oil-globule whose average diameter was 0.4 mm.

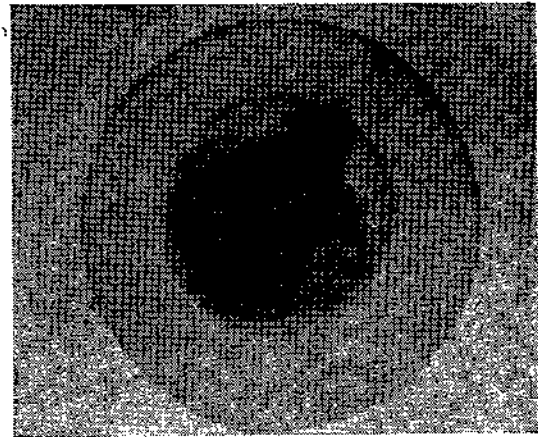


Fig. 11. The egg of "*Clupea*", "Type 5" (X 35)

Only three eggs of this type were found, in the plankton samples at Lat. 09-58-15 N. and Long. 100-35-00 E., on 24 May 1961. The water depth was 56 metres. The

salinity of the water at this location varied from 32.10% to 33.15% and temperature from 28.22° to 30.09° C.

V. *Trichiurus* Type Egg

The characteristics of these eggs were studied by Delsman (1926). He found six different kinds of these eggs in the Java Sea. They all had fairly large diameters of about 1.55 mm.-2.45 mm. and contained oil-globules of considerable sizes varying from 0.41 mm. to 0.65 mm. He referred to Raffaele (1888) who described *Trichiurus* eggs from the Bay of Naples. They were collected from 0 to 60 metres below the surface and were described as being of medium size, 1.6-1.7 mm., in diameter, with a reddish oil-globule, 0.4 mm. in diameter.

Some of the eggs examined in this study might be of *Trichiurus* since the egg-membrane was thick, having a diameter of 1.50 mm.-1.66 mm. The yolk was clear, unsegmented and contained a large oil-globule orange in color of about 0.35 mm.-0.41 mm. The author saw a ring-shaped rudiment of the ductus Cuvieri like a halo round the head in the later stage (Fig. 12).

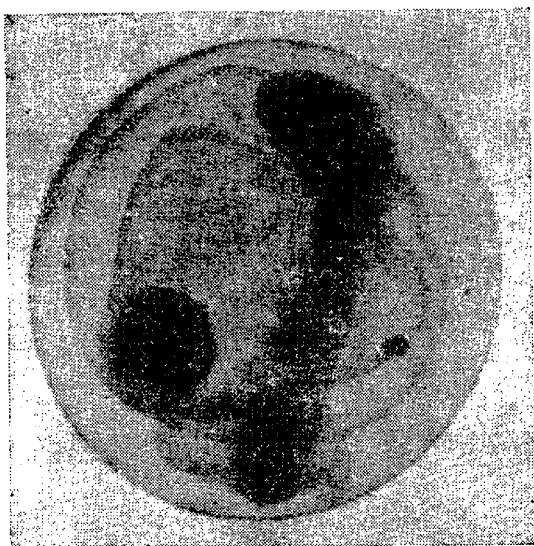


Fig. 12. *Trichiurus* egg (X 40)

Trichiurus eggs were found at about 30-50 miles from the coast, off Chumporn province to Nakornsritamaraj, the depth of the water being about 22-55 meters.

VI. *Fistularia* Type Egg

Delsman (1921-33) described the egg of *Fistularia serrata* in the Java Sea. It was conspicuous by reason of its rather large diameter, this being on an average 1,600 mc. (1,500-1,700 mc.). The yolk was clear and contained no oil globule. This egg had double egg-membranes, which were separated by a little space. The outer one was thicker and stronger than the inner one.

Eggs of this type were found only at five stations in the western part of the Gulf of Thailand. The diameter of the outer membrane was 1.58-1.63 mm. and the inner was 1.84-1.56 mm. The colour of the yolk was pale yellow, unsegmented and without an oil globule (Fig. 13).



Fig. 13. *Fistularia* egg (X 40)

LITERATURE CITED

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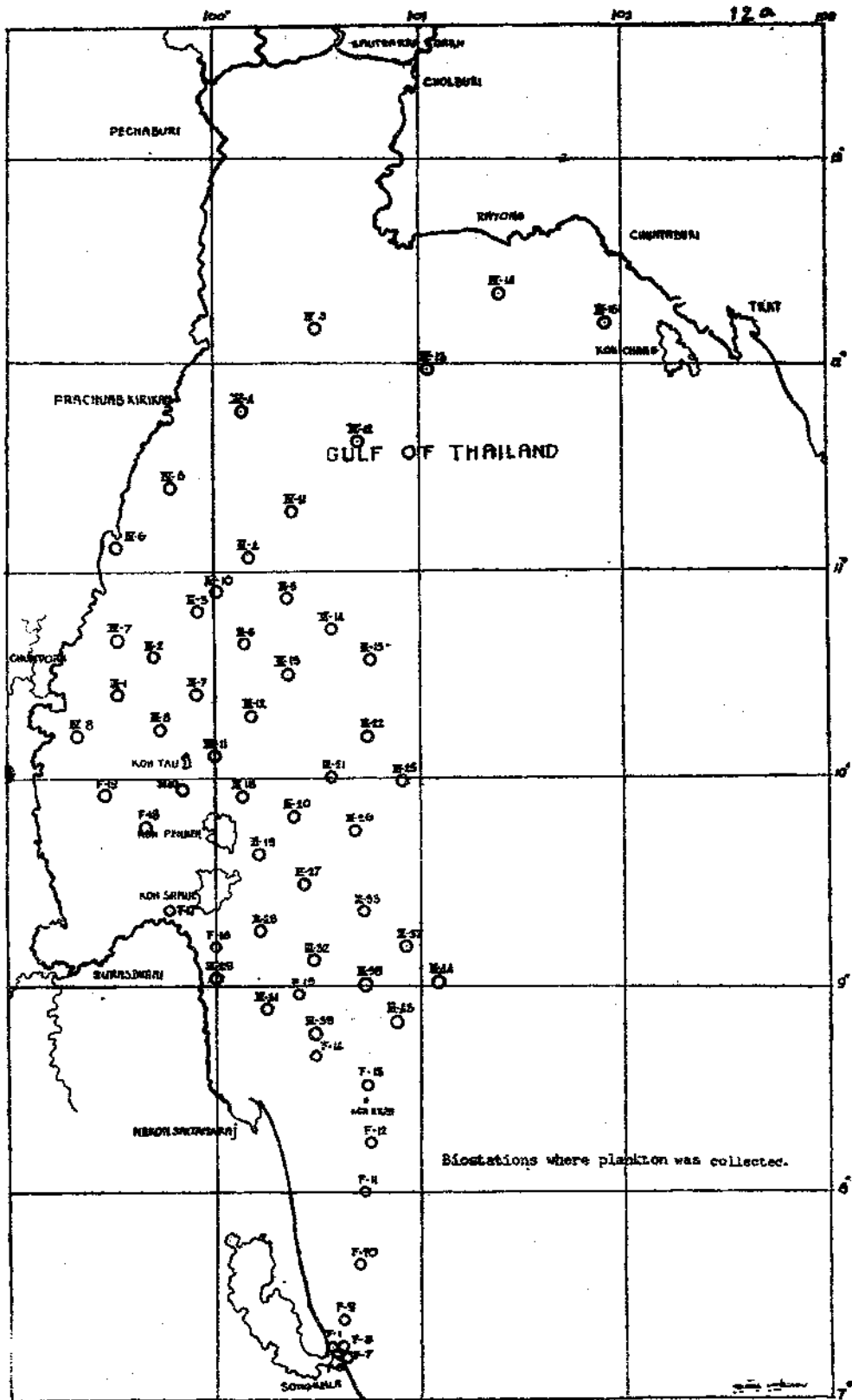


TABLE I

Stations where Fish Eggs were collected
 Symbols: S — *Rastrelliger*; T — *Trichurus*; D — *Dussumieria*; F — *Fistularia*; S_{1,2} — *Stolephorus* types; C₁₋₅ — *Clupea* types.

Cruise	Date, 1961	Station	Sample Position		Depth (meter)		Temp. °C	Salinity ‰	Egg Type
			Lat. N.	Long. E.	Water	Sample			
1/61	21 May	III-8	10°-14'-15"	99°-47'-00"	47	28.0	29.57	32.38	R., T.
	22 May	III-10	09-57-30	99-50-30	36.5	25.0	29.8	32.32	R.
	"	III-11	10-08-30	100-00-00	46.8	31.75	29.74	32.39	C ₂ S ₂
	"	III-18	09-53-50	100-08-00	50.0	35.0	30.08	32.54	T.
	24 May	III-19	09-37-00	100-14-00	22.0	17.5	30.07	32.54	C ₃ T.
	"	III-21	09-58-15	100-35-00	56.5	35.05	30.05	32.01	R., C ₅ , D.
	"	III-22	10-10-30	100-46-45	62.8	42.5	29.89	32.01	R.
	"	III-25	09-59-55	100-52-50	64.0	46.0	29.71	32.25	R.
	"	III-27	09-25-00	100-24-00	46.0	31.75	30.0	32.09	T.
	"	III-28	09-11-05	100-15-00	24.0	17.5	30.09	32.09	R.
	25 May	III-29	09-01-30	100-01-00	12.4	8.5	30.06	32.38	C ₄
	"	III-31	08-55-30	100-15-00	24.0	17.5	30.09	32.10	R., C ₁ , S _{1,2} , D.
	"	III-32	09-06-30	100-29-00	29.0	21.0	29.38	32.07	T.
	"	III-33	09-22-30	100-43-00	43.3	28.0	29.90	32.25	R., S ₁ , D., T., F.
2/61	"	III-37	09-14-30	100-52-30	41.75	28.0	29.6	32.09	R., C., D.
	"	III-43	09-02-15	101-01-30	44.5	31.75	29.82	32.34	T.
	3 June	IV-10	10-54-00	100-02-00	50.2	35.0	29.56	32.32	R.
	"	IV-11	11-16-00	100-22-30	50.5	35.0	29.33	32.34	F.
	4 June	IV-14	12-20-30	100-23-30	31.3	21.0	29.66	32.32	S ₁
	4 July	IV-4	11-47-00	100-10-00	34.0	25.0	28.47	32.48	C ₂
	5 July	IV-5	11-25-00	99-50-00	39.28	28.0	28.62	32.81	R., S ₁ , S ₂ , D.
	"	IV-6	11-06-00	99-37-00	27.5	19.0	28.43	33.19	R., S ₂
	"	IV-3	10-50-00	99-58-00	51.5	35.0	28.76	32.50	T.
	"	IV-4	11-05-00	100-12-00	51.5	35.5	28.91	32.54	F.
3/61	"	III-10	09-57-30	99-51-00	39.5	28.0	28.62	32.10	R., S ₂
	26 August	F-10	27-40-30	100-39-00	25.0	21.0	29.02	33.06	R.
	27 August	F-13	08-29-30	100-41-00	28.5	21.0	28.92	33.15	R., C ₂ , F.
	"	F-14	08-40-00	100-28-30	28.0	21.0	27.98	32.70	R., C ₂ , S ₁ , S ₂
"	F-16	09-09-53	100-00-15	14.5	14.0	28.82	32.66	C ₁ , D.	

3/61	27 August	F-17 IV-8 IV-7 IV-6 IV-5	09°-25'-00" 10-10-02 10-40-13 11-06-00 11-24-55	99°-48'-15" 99-21-28 99-33-07 99-38-07 99-49-45	11.75 25.0 40.8 42.0 42.0	10.5 21.0 31.75 31.75 31.75	28.57 27.98 28.23 28.22 28.23	31.64 32.70 28.23 33.06 33.12	S ₃ , S ₄ , S ₅ R. D. C ₂ S ₁ , S ₂ , F.
4/61	17 September	III-6 III-7 III-9 III-18 III-20 III-26	10-39-45 10-24-00 10-03-30 09-54-00 09-47-30 09-44-55	100-09-30 100-55-45 100-38-00 100-08-45 100-24-30 100-40-15	55.0 54.0 36.0 37.5 54.0 56.0	42.5 39.0 28.0 28.0 42.5 42.5	28.57 28.68 28.30 28.79 29.10 28.52	32.95 32.97 33.01 32.86 33.13 32.68	S ₂ , T. R., C ₁ , S ₁ , S ₂ , D., T. S ₁ , S ₂ C ₁ S ₁ , D. R., C ₁ , S ₁ , S ₂ , D.
	18 September	III-20 III-26 F-1	09-47-30 09-44-55 07-16-03	100-24-30 100-40-15 100-32-56	54.0 56.0 4.75	42.5 42.5 4.5	28.52 28.94 29.14	33.15 33.13 33.10	S ₃ , S ₄ S ₄ S ₃ , S ₄
	20 September	F-3 F-6 F-7	07-16-03 07-13-52 07-13-04	100-37-00 100-35-23 100-36-54	13.0 5.75 8.5	12.5 3.5 7.0	29.14 28.97 29.22	33.13 33.10 32.95	S ₃ , S ₄ S ₃ , S ₄ S ₃ , S ₄