

ORDINARY, MS.

<i>Public</i> DEPARTMENT.	
G.O., DATED	<i>20-6-58</i>
No.	<i>494</i>

INDEXED.

When given for copying.

[Despatch Abstract.]

*Recording of
 the deficit-revenue
 the administration
 of the Govt
 Central Museum
 for 1992-93*

6TH JUNE 1893, Nos. 478, 478A, REVENUE.

GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

From Dr. H. WARTH, Officiating Superintendent, Government Central Museum, to the Secretary to Government, Revenue Department, dated Madras, 28th April 1893, No. 513.

I have the honour to submit to the Right Honorable the Governor in Council my report on the working of the Government Central Museum during 1892-93.

ADMINISTRATION REPORT OF THE GOVERNMENT CENTRAL
MUSEUM FOR THE YEAR 1892-93.

1. VISITORS TO THE MUSEUM.—The statistics of the number of visitors are given in appendix A. The total number was 341,238 against 361,452 in the previous year. The deficient number may have been due to the continued drought. The number of gosha visitors was 1,957 against 1,409 in the previous year.

The following statement shows the number of visitors to the Museum during the last five years:—

1888-89	...	...	...	...	...	...	...	...	337,801
1889-90	...	...	...	...	...	...	...	...	378,234
1890-91	...	...	...	...	...	...	...	...	364,542
1891-92	...	...	...	...	...	...	...	...	361,452
1892-93	...	...	...	...	...	...	...	...	341,238

On two days of the year it is customary for Hindus to visit the Museum in large numbers. On the 31st December there were 13,862 visitors and on the 14th January 40,301.

2. DONATIONS TO THE MUSEUM.—A list of the donations of specimens will be found in appendix B and of books and periodicals in appendix C.

3. BUILDINGS AND GROUNDS.—The Museum building and the Superintendent's house underwent general repairs during the year. A reservoir was erected near the taxidermist's room for use in macerating bones and preserving skins of large size. The downstairs hall of the Museum building underneath the mineral gallery was provided with windows for the better utilization of this reserve space. A single storied out-house on the north-east side of the Museum buildings was made into an office room to render the old office room available for the enlargement of the mineral gallery. The wooden roof verandah on the upstairs of the Superintendent's quarters was covered with a layer of Mangalore pattern tiles. A new shed was erected for placing in order and protecting from rain the large number of Amaravati marbles.

4. TOURS.—The Officiating Superintendent made the following excursions:—

To the Shevaroyis in the Salem district where the taxidermists were occupied with the collection of birds and other specimens; also to Sithampundi in the same district for the purpose of inspecting corundum deposits.

To Hunsur in Mysore territory to visit the corundum deposits.

To the cretaceous rocks of the neighbourhood of Pondicherry at the occasion of a geological excursion with students of the Presidency College.

To Trichinopoly twice for ascertaining more exactly the extent of phosphatic nodules and for making collections of cretaceous fossils.

(For remarks on the above inspections, see appendix E.)

The Second Assistant was deputed twice to the Trichinopoly district, once for the collection of 1 ton of phosphatic nodules for sending to the Right Honorable the Secretary of State for India for purposes of examination and analysis, and a second time for making some preliminary excavations on the site of the deposit of phosphatic nodules.

The collecting taxidermist was also deputed to Bellary for specimens. The herbarium-keeper completed the collection of cotton plants and produce of the Madras Presidency which had been commenced in the previous year for the London Imperial Institute and he travelled for the purpose in the cotton-producing districts of Bellary, Kurnool and Cuddapah and he also went to Mysore.

5. ART GALLERY.—One broken stone flute obtained from the treasures belonging to the Royal house of Tanjore was presented by Mr. Misquita of the "Victoria Natural History Institute" and was exhibited together with the ancient arms from Tanjore.

The collection of articles illustrating the ethnology of the Todas (a hill tribe of the Nilgiris) referred to in my last report was exhibited in the art gallery together with the model of a Toda hut received during the year. Specimens of Sivaganga brassware purchased during the year were exhibited in a small wall case. Two well sculptured bronze statues, procured through the Collector of North Arcot, were exhibited along with others in the Museum collection as well as one Perumal idol belonging to the ruined Chola temple at Poigai, Vellore taluk, presented by the Acting Magistrate of North Arcot and a statue and a bowl procured through the Collector of Trichinopoly under the Treasure Trove Act. A tray of inlaid Tanjoreware was added to the existing collections during the year.

A number of articles were obtained from the Madras Arsenal stores including a model of the Madras Lighthouse and of the Munro monument.

6. ETHNOLOGY AND ANTIQUITIES.—The antiquities have received an important addition through Mr. Rea's discoveries amongst the ruined Buddhist stupa at Bhattiprolu, Rēpalle taluk, of the Kistna district. Mr. Rea unearthed three foundation stones which were buried at different depths in the central axis of the stupa.

These foundation stones contain inscriptions and they were exhibited in the sculpture gallery and the contents of the stones were deposited in the coin room of the Museum.

The alphabet, we are informed, indicates the age of the relics to date back to about 240 B.C. The relics of the three caskets together include, besides numerous gold leaves, coins, plates of metal, &c., three round receptacles made of colorless and perfectly transparent rock crystal highly polished with lids and about 2 inches diameter.

Further a six-sided quartz prism 3 inches long with characters scratched on each side, numerous small pearls which have all more or less lost their lustre, two small bits of perforated coral, two small beads of quartz crystal and probably topaz, three amethysts and five beryls from $\frac{1}{4}$ to $\frac{3}{4}$ inches long. The beryls are of a light blue and particular care was taken to make certain that they had been correctly recognized. One of them, of 2.69 specific gravity, was examined under the polariscope by Dr. Max Bauer and two of them show the hexagonal prism of the original crystals.

There was another beryl of larger size, a six-sided prism $\frac{3}{4}$ inches high which was well polished and hollowed out so as to make a small phial holding three tiny bits of bone. It differed from the other beryls by its greenish colour, but it was well ascertained as beryl by its hardness, specific gravity = 2.67, its form and the uniaxial interference rings which it showed in polarized light. The phial has a lid of quartz and was coated with gold. Some further details may be gathered from Mr. Rea's letter, see G.O., No. 270, dated 22nd April 1892, Revenue Department.

Two pattern rails of Buddhist sculptures from Amaravati aggregating to 45 feet length with two rows of rosettes were erected by the Archaeological Survey. A further selection of sculptures was made for erecting a larger portion of rail 43 feet long and 15 feet high with 3 rows of rosettes and cornices resting on them according to the pattern of the original stupa.

The remaining sculptures were set up in inclined positions under the shelter of temporary arcades 130 feet in length. This facilitates the inspection and a walk through the sheds shows what a great variety there is in the sculptures and how many of them are in an excellent state of preservation. Seven pieces of ancient pottery and

2 pieces of gold female head ornaments dug out of tombs called Rakshasa Guthalus in the village of Tangarapalli, Markapur taluk, Kurnool district, were received from the Collector of Kurnool. Some ancient pottery with bones, a sculptured slab and a rough-stone relic casket were received at the end of the year from the Superintendent, Archaeological Survey, Madras, who discovered these articles at the Buddhist remains of Arugolu in the Godavari district. Veterinary Captain R. W. Burke, F.R.C.V.S., kindly examined the bones and recognized a number of them as belonging to a large ruminant. There were 2 incisor teeth, portion of metacarpus, metatarsus, ischium and ilium. There were also some flat plates resembling the shields of a tortoise.

A facsimile of Asoka inscriptions measuring 15 feet by 11 feet was received from Dr. E. Hultzsch, Government Epigraphist, Bangalore, and hung up on the wall of the antiquity gallery. Two stone cart wheels were purchased through the aid of the Collector of Kurnool and exhibited in the antiquity gallery. These wheels are made of hard gneiss and largely used at this present day; but they will be of interest to visitors from districts in which such wheels are unknown. As they will in time be replaced by wooden and iron wheels, it is perhaps not out of place to exhibit them along with stone implements and other antiquities.

A cannon found in the Getty Mandali tank, Namakkal division, Salem district, and presented to the Museum by the Collector and an earthen jar found buried in a paramba called Kuttialipurath in Mainlayi amsam and desam in the Chirakkal taluk, Malabar district, and procured through the Acting Collector.

The following photographs presented by His Highness Rama Varmah, the 1st Prince of Travancore, were hung up in the library:—

Suchindrum tower, a teppakolam at South Travancore.
The Tripurapu falls, South Travancore. The Kuttalam falls, Tinnevely district.

7. HERBARIUM.—Specimens of cotton plants from 7 districts and parts of Mysore collected by the herbarium-keeper were sent to Calcutta for the Imperial Institute where it is expected that they will be accurately named. Duplicates were reserved for the Herbarium. Fifty other botanical specimens from these districts and from Mysore were added to the Herbarium, and a number of plants were identified for private parties.

Dr. G. King, Superintendent, Royal Botanical Gardens, Calcutta, presented 133 dried plants from the Malay peninsula and the Andamans.

8. ECONOMIC PRODUCTS.—Simultaneously with the botanical specimens, samples of cotton in capsules, ginned cotton and cotton fabrics were obtained for the Imperial Institute and for the Museum.

Samples of Brush-making material were received from the Board of Revenue, Madras, as follows:—

Aloe	Screwpine.
Palmyra.	Pongdicodi (Tamil name of a plant not yet determined).
Cocoanut	
Also from the Collector, South Arcot—	
Cephalandra Indica.	
Further were received—	
Rubber made of Calotropis gigantea	
Sandalwood oil.	
Soap.	

Further collected in the Bangalore gardens—

13 specimens of fruits and seeds.

For the Chicago Exhibition the Forest Department was supplied with 9 specimens of woods and products and 15 specimens of dye-yielding substances.

A commencement was made to re-arrange the whole of the economic collection in accordance with Dr. Watt's dictionary, the letter F having been reached at the end of the budget year.

9. MINERAL GALLERY.—The mineral gallery was entirely re-arranged so as to form one continuous collection of the mineral rocks and fossils of Southern India. Hitherto the mineral gallery had been split up into 50 collections by the separate exhibition of economic minerals, ores, marbles, &c., and of the minerals and of the

rocks of each individual district. Suitable as this arrangement was for showing at a glance what each district produced, the detailed collections were too small to be really instructive. It was therefore decided to abolish all divisions and to make the whole collection into one series, scientific specimens and economic samples of all descriptions being every one brought into its proper place according to the scientific classification of minerals and rocks.

The united collection begins with meteorites and after them the minerals are in the same order as they were formerly arranged in the index and district collections.

The rock collection is divided into eruptive, metamorphic, and sedimentary rocks arranged according to mineral constitution only. Next we have one case illustrating geological phenomena weathering glaciation, &c.

Lastly we have the fossiliferous formations of Southern India chiefly represented by fossils from the cretaceous strata of Trichinopoly which have been added during the year.

Appendix D shows the arrangement of the mineral gallery more in detail and serves at the same time as a catalogue.

The mineral gallery shows now easily the distribution of each species in the entire Presidency and students have before them of each kind of mineral all specimens from different localities.

Specimens of each kind are still arranged according to districts in the same order as followed in the mineral catalogue of 1890, so that by the aid of this catalogue all the specimens of one particular district may be found in their new places.

Numerous specimens of corundum were added to the collection during the year. The number of localities represented is now 30 from nine districts and two principalities (appendix E).

Corundum was presented to the Museum by H. G. Turner, Esq., H. R. P. Carter, Esq., and W. F. Petrie Hay, Esq., of Hunsur and others as shown in the list of donations, appendix B. Further additions were due to the Officiating Superintendent's visit to the corundum localities of Sithampundi in the Salem district and Hunsur in Mysore. Details about these visits will be noticed in appendix E.

Specimens of phosphatic nodules from the deposits in the Trichinopoly district were analysed and the results are reproduced in appendix E. The same appendix contains also details about the entire deposit examined during the year. The quantity of nodules estimated lying loose on the surface is 4,000 tons.

The spread of the deposit over such a large area of 10 square miles would *prima facie* produce expectations of more important deposits under ground. For reasons shown in the appendix, such deposits were, however, hitherto not considered workable. As soon as practicable one or two sections will be thoroughly examined, so that no doubt can remain as to the nature and extent of the strata from which the surface deposits of phosphates have weathered out. It may here also be mentioned that celestine (Strontium sulphate) was found amongst the same deposits in large quantity. An analysis of the mineral was made by Herbert H. Dains, Esq., Vizianagrum.

A considerable number of cretaceous fossils were collected during two tours in the Trichinopoly district. They occupy ten new cases in the mineral gallery besides 968 specimens of 171* species more or less which were sent to Europe. These Dr. W. Waagen has kindly undertaken to examine. They comprise a large number of ammonitidae. Amongst others, 100 specimens of ammonites rotomagensis were included to facilitate eventually a determination of varieties.

	Species.
* Coelenterata	5
Echinodermata	5
Annulosa	9
Lamellibranchiata	38
Gastropoda	47
Cephalopoda	67
Total ...	171

A reference to the donation list shows the minerals which were presented to the Museum during the year. Amongst them I would mention garnet crystals from Messrs. Arbuthnot and Co. Many of these show the icositetrahedron, the 24-faced form 2-1-1.

Also kyanite and crude asbestos.

Mr. Primrose presented coal from the Tenasserim in Lower Burmah.

A collection of 92 pot stone articles and sample blocks was made for the Imperial Institute.

The Collectors of nine districts have contributed (Nellore, Kurnool, Bellary, Anantapur, North Arcot, Salem, Coimbatore, South Canara, Malabar) and the Bangalore Museum supplied a collection from Mysore.

Specimens of corundum and of phosphatic nodules were also sent to Calcutta for the Imperial Institute.

10. NATURAL HISTORY.—Mr. A. T. Pringle has been so kind to take in hand the enlargement of the collection of butterflies from the neighbourhood of Madras city. He has contributed many specimens and has arranged to place in the collection as many as 5 specimens of each species.

Fish.—The following fish, all from the Madras coast, were preserved during the year.

In alcohol.—*Narcine timlei*, *Pempheris mangula*, *Caranx leptolepis*, *Arius* sp., *Exocoetus pœcilopterus*.

Stuffed.—*Carcharias melanopterus*, *Zygæna blochii*, *Stegostoma tigrinum*, *Clarias magur*, *Clupea toli*, *Serranus hexagonatus*, *Serranus boenack*, *Lutjanus rivulatus*, *Lutjanus roseus*, *Diagramma cuvieri*, *Lethrinus karwa*, *Polynemus indicus*, *Caranx hippos*, *Chorinemus lysan*, *Thynnus thunnina*, *Cybbium commersonii*, *Cybbium guttatum*, *Mugil cunnesius*.

The specimen of *Rhinodon typicus* referred to in the last report has been entirely remounted. A wooden frame was made which consisted of a girder over the whole length to which ribs shaped accurately according to measurements were fastened at every foot distance. Over the ribs dealwood bars were fastened lengthways and shaped according to the outline of the fish. The skin was soaked in concentrated alum solution in a reservoir built with cement but coated with tar. After the skin had remained in the solution for three weeks it was taken out, coated internally with arsenical paste, mounted on the model and sewn up. It was very pliable when it came out of the alum and after drying it became very hard and tight. A thin layer of tow was stuffed between the model and the skin. As it was impossible to fit the model to exact size, it had been made a little smaller and the deficiency was made up by stuffing. After the fish had thoroughly dried, the gill openings were closed with oilpaste and the whole fish varnished. The fish is now after a lapse of half a year in perfect order. Further notes and a ferro-cyanide picture of the fish are added in appendix F.

A rare specimen of a snake, *Dipsas Forsteni*, from the Palmanér hills, Kátpádi, North Arcot, was presented by Mr. H. R. P. Carter, and two fine specimens of lizards, *Calotes ophiomachus* were presented by Dr. J. R. Henderson. An ibex skin with its skull presented by Mr. A. W. Turner will be mounted over a wooden frame. A fine specimen of bison's skull was purchased from W. Ditmas, Esq., who had lent it to the Museum for exhibition (see Administration Report, 1884-85). The bison was shot just within the Coorg frontier on the Brahmagiri hill. The horns are 43 inches across. Seventy-six birds and mammals were stuffed and added to the collection.

Appendix G gives a list of all the birds and all the mammals excluding skeletons from Southern India which were in the Museum at the close of the year under report. This list is added with the special object that naturalists and sportsmen, who may be inclined to assist the Museum by presenting specimens, may know what specimens the Museum is in want of.

11. NUMISMATICS.—As will be found in the list of donations (appendix B), the Museum is indebted for contributions of coins to the Asiatic Society of Bengal and to its Bombay branch, to Colonel Fane Sewell, to several district authorities and others. Twenty Gupta coins were purchased, chiefly Pathans, so that the total number of coins received were 188. Thirty coins obtained by the Museum with the late Mr. Scotts' collection during 1891-92 were examined by Dr. E. Hultzsch. They comprise coins of Vijayanagara, Chola, Madura, British India Company and 1 French coin of Karikal. An account was published by Dr. E. Hultzsch in the Indian Antiquary of November 1892.

12. LIBRARY.—The number of visitors to the library during the year was 6,622 against 6,298 in 1891-92.

The additions to the library were as follows:—

	Works.	Volumes.
* Donations of standard works ...	101	269
* Donations of periodicals ...	15	164
Reports and other papers presented by Government ...	99	169
Purchased standard works ...	52	87
Purchased periodicals ...	32	459
Publications of the British Museum ...	5	7
Papers of the patent office ...	4	102
Records of the Master of the Rolls ...	9	13
Parliamentary Blue books ...	41	45
Total ...	358	1,315

* For a list of all donations to the library, see Appendix C.

GOVERNMENT CENTRAL MUSEUM,
EGMORE,
Madras, 28th April 1893.

(Signed) H. WARTH,
Offg. Supt., Govt. Central Museum.

APPENDICES.

A.

VISITORS TO THE GOVERNMENT CENTRAL MUSEUM DURING THE YEAR 1892-93.

Total number of visitors in each month—

April ...	29,440	December ...	42,216
May ...	20,147	January ...	69,260
June ...	20,488	February ...	18,933
July ...	28,388	March ...	20,736
August ...	22,857		
September ...	23,147	Total ...	341,238
October ...	24,009		
November ...	26,617		

Of these there were men and boys 54 per cent., women and girls 46 per cent.
Of these 341,238 visitors the following numbers signed their names in—

English ...	30,090	Maharatta ...	46
Tamil ...	23,852	Bengali ...	93
Telugu ...	7,438	Chinese ...	6
Hindustani ...	3,252	Singalese ...	3
Canarese ...	679		
Malayalam ...	688	Total ...	66,671
Goojeratti ...	444		
Nagari ...	80		

The remaining (80 per cent.) could not write their names.

B.

LIST OF SPECIMENS PRESENTED TO THE GOVERNMENT CENTRAL MUSEUM DURING THE YEAR.

Abboy, T., Naidu—

50 specimens of plants; 13 specimens of fruits and seeds.

Arbutnot and Co., Mossra, Madras—

Garnets and mica schist containing garnets; crystals of kyanite and a kind of asbestos: all from Mysore State.

Arsenal, Madras, officer in charge of—

Bellows, wooden, Chinese.

Block, wooden, teak, 1 cubic foot.

Bolster for cutting dies with spring complete.
Hydraulic crane lifting heavy weights.
Hydrostatic press.
Instruments, brass, for taking distances.
Instruments for laying mortars proposed by Lieut. Gloay.
Machines for cleaning shot.
Madras Light-house.
Monuments (Munro), Man and horse made of brass.
Sundial model.
Water level, French.

Athisayam, T. G., Mr.—

8 shells; 1 scorpion; 2 eggs of *Corvus splendens* the common Indian crow; 2 eggs of *Hirundo* (the red-humped swallow); 1 egg of *Cotyle sinensis* (the Indian bank martin); 1 egg of *Leptocoma zeylonica* (the Amethyst-rumped honey-sucker); 1 egg of *Passer flavicollis* (the yellow-necked sparrow); 1 egg. (The above specimens were collected at Vizagapatam).

Bakerson and Co., Richard, Messrs., East Cheap, London—

1 sample of monazite sand.

Board of Revenue, Revenue Settlement, Land Records and Agriculture—

12 sets of manufactured articles and samples of fibres and brush-making materials from the districts of North Arcot, South Arcot, Madras, Chingleput and Tinnevely; Felspar found with corundum at Kemmar village, South Canara; corundum from Kemmar village, Uppinangudi taluk, South Canara.

Bradley, H., Esq., Acting Collector of Kurnool—

2 gold female head ornaments (conic disc and a ribbon) 1 tolah. Found in a stone-lined tomb with earthen vessels and human remains in the village of Tungaralappalli, Markapur taluk, Kurnool district. Such tombs are known in locality as "Rakshasa Guthalus" and are locally supposed to have been used as places of refuge by the Rakshasas in their wars with Rama. Two guthalus were dug up—one a stone-lined grave 7' by 5' 6" deep, covered with very heavy rough slabs. In this were only pottery and human bones. The second measured 6' 3" by 1' 4", depth 2' 3", covered with large stone slabs 6" thick. The upper part of this tomb was found 7½ feet below the ground. White blocks of quartz marked the site of the tombs. Seven ancient pottery dug out of the tombs called "Rakshasa Guthalus" described above.

Burns, L. H., Esq., Kilpauk, Madras—

A large black scorpion found in Kilpauk.

Carter, H. R. P., Esq.—

1 snake (*Dipsas forsterie*), Palmanér Hills. This snake was found eating a bat, and it is a rare species; 1 spider (*Mygale faciatu*); 1 crocodile. Specimens of corundum from Shegrispollam and Karootapollam of Palladam taluk of the Coimbatore District.

Dobie, S. L., Esq., Superintendent, Government Lunatic Asylum—

1 copper coin from Calicut of 1746.

Dunhill, H. A. R., Esq.—

1 egg.

Farquhar, William, Esq., Bombay—

4 crystals of crysoberyl.

Gaudoin, H., Mr., Student, Doveton College, Madras—

1 honey comb.

Hay, P. F., Esq., Hunsur, Mysore Province—

Many specimens of crystalized corundum from the Hunsur taluk in Mysore: specimens of corundum rock including a block 305 lb. weight.

A sample of sandalwood oil made at Hunsur, Mysore Province.

Henderson, J. R., Dr.—

2 *Calotes ophiomacrus*.

His Highness the First Prince of Travancore—

2 photographs of Travancore scenery; 1 picture representing the Suchindrum tower and Teppacoolam (South Travancore).

Holder, E., Esq., Acting Superintendent, School of Arts—

1 sample of kaolin from Bellary district.

Holmes, W. T. H., Esq., Madras Club—

To illustrate the use of mica in electric apparatus 10 mica foils for electric lights. A piece of rubber made from 6 ounces of the white juice of *colotropis gigantea*; specimens of corundum from Pasur.

Honorary Secretary (Philological) Asiatic Society of Bengal—

Pathan coins—Sher Shah ... 5 } Found in Saugor district.
Goozerati coins—Muzaaffar Shah ... 5 }

- Moghul gold coins—10 of Jehangir, Shah Jehan and Aurangazib.
 Moghul silver coins—8 of Jehangir, Shah Jehan and Aurangazib.
 Moghul gold coins—2 of Muhammad Shah.
- 7 specimens of a find of ancient coin in Kangra district—
 Bactrian apollodatus 2
 Old Hindu Kuninda variety 5
- Honorary Secretary, Bombay Branch Royal Asiatic Society, Bombay—
 1 silver coin *guddhea* found in the Nassick district.
 1 silver coin *gupta* found in the Kaira district.
- Honorary Secretary, Indian Museum, Calcutta—
 26 silver coins from Gwalior durbar, viz., silver rupees of Khar Shah of the months of Shahi, Jehangir of the Ilahi year, Shah Jehan, and Aurangazib.
- Hultzsch, E., Dr., Government Epigraphist, Bangalore—
 Facsimile of inscription of Devanam Piye Piyadasi (Asoka) on a rock near Siddapur, Chitaldroog district, Mysore.
- Jardine, W. B., Esq., Hospet, Bellary—
 2 buck skins.
- Jayaram and Brothers, Messrs., Auctioneers and Commission Agents—
 Civet cat.
- Joint Honorary Secretary, Bombay Branch Royal Asiatic Society, Bombay—
 1 gold fanam found in the Dharwar district.
- Kelly, F., Mr., Poodoopet—
 1 duck's egg.
- King, G., Dr., Superintendent, Royal Botanical Gardens, Calcutta—
 133 dried specimens of plants from the Malayan Peninsula, Andamans, &c.
- Kuruvilla, K. B. A., Mr., O. M. S. College, Kottayam, Travancore—
 Garnetiferous rock.
- Love, H. D., Major, R.E.—
 1 hornblende schist with garnet; 1 moth *actias selene*.
- Marshall, H. H., Esq., Madras—
 2 specimens of sea-snake (*Chersydrus granulatus*) from Ennore.
- Meenakshi Soondramiah, M. S., M.R.Ry., Sivaganga, Madura district—
 1 Meenatchy rose soap.
 1 carbolic toilet soap.
 1 Meenatchy transparent glycerine soap.
 1 Terbine soap.
 1 shaving bar soap, $\frac{1}{2}$ pound.
- Meppan, F. D., Esq., Bangalore—
 Samples of asbestos from Mysore, Canada and Italy.
- Misquita, T., Esq., Victoria Natural History Institute, Madras.
 1 broken stone flute.
- Morrison, E., Esq., Egmore—
 15 plates of mica from Nellore of dark color.
- Moore Theod Mr., Mineral Prospector, Badami district, Southern Mahratta Railway, Deccan—
 Pyrite crystals transformed into limonite in Kaladgi.
- Municipal Commission, Madras, the President—
 1 tapir (6 days old); 1 lion; 1 leopard;
 1 portax pictus (the Nilgai); 1 purple coot (*porphyrio policephalus*); 1 ourang-outang.
- North Arcot, Collector and District Magistrate of—
 9 pieces of corundum tapering hexagonal crystals with rock matrix adhering; 1 old Perumal idol from ruined Chola temple at Poigai, Vellore taluk.
- Pinhey, Arthur, Esq., Collector of Vizagapatam—
 Collection of shells of sorts; 2 tor-toise shells.
 1 cast (*Abhyasthum*).
- Primrose, A. H., Esq.—
 1 ferruginous slab with leaf impressions and coal from Tennaserim.
- Pringle, A. T., Esq., Madras Secretariat—
 A collection of butterflies from Madras City.
- Rea, A., Esq., Superintendent, Archaeological Survey—
 6 slabs of stones from Pedda Ganjam; relics from three foundation stones of a Buddhist stupa at Bhattiprolu, Kistna district; some ancient pottery with bones; a sculptured slab and a rough stone relic casket discovered at the Buddhist remains of Arugolu in the Godavari district.
- Salem District, General Deputy Collector, Namakkal division—
 1 cannon.
- Sargeant, W. H., Esq.—
 1 rhombus of mica.

- Sewell, R., Esq., Collector of Bellary—
 1 specimen of felspar.
- Sewell, Fane, Colonel—
 52 copper coins (chiefly Pathans).
- South Arcot district, Collector of—
 6 Porto Novo gold pagodas; 37 small gold coins.
- Streeramulu Rajoo, M.R.Ry., Contractor, Madras—
 3 corundum specimens from Coorg, Mysore and Salem.
- Subraya Sastry, M.R.Ry., District Munsif, Gooty—
 1 nest of *ploceus baya* (the common weaver bird).
- Tailor, R. S. M., Mr., Poodoopet—
 2 Hyderabad copper coins.
- Thomson, J., Esq., Collector of Chingleput—
 4 gold coins; coin figured by Sir Walter Elliot, Pl. I, Fig. XII.
- Thurston, Edgar, Esq.—
 Mus *perrotetti*, Coonoor.
- Trichinopoly district, Collector of—
 Idol of Krishna and Bowl.
- Turner, A. W., Devikulam—
 1 skin and skull of a buck (*Nilgiri Ibez*)—
- Turner, H. G., Esq.—
 Specimen of corundum.
- Venkatasubbiah, M.R.Ry., Acting Deputy Tahsildar, Paramatti, Salem district—
 Corundum specimens from Paramatti, Salem district.
- Warth, H., Dr.—
 Berlin Fisheries Exhibition medal.
 7 striated pebbles, &c., from Glaciers and ancient Moraines in Switzerland collected in June 1890.
- West, H. S., Esq.—
 1 snake (*Lycodon aulicus*); 2 pieces of mica schist from Tettoo in Nellore district.

C.

DONATIONS TO THE LIBRARY.

Standard Works.

- Agricultural Department—Bulletins Nos. 24 to 26, Names of the Field Crops grown, Palmyra, Palm and its uses, Sugar Mill, Madras, 1892, 3 copies.
- American Museum of Natural History—Bulletin, 1891.
- Annals of the Queensland Museum No. 2—Zoology of British New Guinea, 1892.
- Appendix Series of the Indian Forester.—Iron Resources and Iron Industries of the Southern Districts, Madras Presidency; Resin and Turpentine from Indian Pines, 2 copies.
- Archæological Drawings.—Plates and Texts, 1892, 34 copies.
- Army (Annual) Act (55 Victoria, Chapter 2), 1892.
- Bendire, C.—Life Histories of North American Birds, United States National Museum, Special Bulletin No. 1, 1892.
- Benson, C.—An Account of the Normal Distribution of the Rainfall in the Madras Presidency 1892.
- Black, C. E. D.—A Memoir on the Indian Surveys, 1875 to 1890, 1891.
- Blanford, W. T.—Fauna of British India, Ceylon and Burma (Mammalia), 1888-91.
- Boettger, O.—Herpetologische Mitteilungen, 1892.
- Bollettino Della Societa Di Naturalisti in Napoli—Vols. 5 and 6, 1891-92, 2 copies.
- Brazier, J.—Marine Shells of Australia and Tasmania No. II (Pteropoda), 1892.
- Burgess, J.—Report of the Archæological Survey of India, North-Western Provinces and Oudh, New Series, Vol. I, 1889.
- Canadian Institute Transactions, 1891-92, 2 numbers; Annual Archæological Report and an Appendix to the Report of the Minister of Education, Canadian Institute, Session 1891.
- Catalogue of Mysore Exhibits for Exhibition at Chicago, 1893.
- Catalogue of Books in the Library of the Mysore Government Museum, Bangalore, 1892.
- Catalogue of Books in the Library of the Presidency College, Madras, 1888.
- Catalogue of the Diptera of the Oriental Region by M. J. M. T. Bigot, Part 2, 1891.
- Catalogne of Rare and Valuable Gold, Silver and Copper Coins, the property of Mr. Eugene Legget, Karachi, Sind.

- Catalogue of Sanskrit Manuscripts in the Library of the India Office, Part 3, 1891.
 Census of India (1891)—Assam Report, Tables and Resolution, 1892, 3 vols.; Berar or the
 Hyderabad Assigned Districts, Vol. 6, 1892; Bombay, Vols. 7 and 8, 1892, 2 vols.; Burma
 Report, Vols. 9 and 10, 1892, 2 vols.; Punjab and its Feudatories, Vols. 20 and 21, Parts 2
 and 3, 1892, 2 vols.; Rajputana, Vol. 26, Parts 1 and 2, 1892, 2 vols.
 Challenger, H. M. S.—Report on the Scientific Results of the Deep Sea Deposits, 1891.
 Chatterton, A.—Proposals for Utilizing Water-power in Southern India, 1892.
 Cincinnati Museum Association—Catalogue of an Exhibition of Modern Etchings and Drawings,
 1892; Catalogue of Oil Paintings and Sculpture, 1892.
 Commercial Museum at Frankfurt, Germany, 1886.
 Cotes, E. C.—Notes on a Conspectus of the Insects which affect Crops in India, in the Indian
 Museum, Vol. 2, No. 6, 1893.
 Cunningham, D. J.—Contribution to the Surface Anatomy of the Cerebral Hemispheres, 1892.
 Distant, W. L.—Oriental Cicadidae in the Indian Museum, Calcutta, 1892.
 Douglas, J.—Bombay and Western India, 1893, 2 vols.
 Duthie, J. F.—Fodder Grasses of Northern India, 1888.
 Duthie, J. F.—Illustrations of the Indigenous Fodder Grasses of the Plains of North-Western
 India, 1886-87, 2 parts.
 Edinburgh University Calendar, 1869-70 and 1878-79, 2 vols.
 Eigenmann, C. H. and R. S.—Proceedings of the California Academy of Sciences, Vol. 3,
 Part I, 1891.
 Eliot, J.—Indian Meteorological Memoirs, Vol. 5, Parts 1 and 2, 1892, 2 parts.
 Eliot, J.—Meteorological Observations, 7 copies, 1891; 10 copies, 1892, 17 copies.
 Eliot, J.—Indian Weather Review Annual Summary, 1891.
 Eliot, J.—Monthly Weather Review from July to December 1891, and from January to October
 1892, 16 copies.
 Fleming, S.—An Appeal to the Canadian Institute on the Rectification of Parliament, 1892.
 Ganguli, G. D.—Catalogue of the Reference Library of the Provincial Museum, North-Western
 Provinces and Oudh, 1891.
 Geographical and Statistical Memoir of the Survey of the Travancore and Cochin States, Vol. I,
 from July 1816 to the end of the year 1820, 1863.
 Geological and Natural History Survey of Canada—Annual Report, New Series, Vol. 4, Part D,
 Maps Nos. 1 to 9; Part N, Nos. 1 to 3, 1888-89.
 Geological Survey of Victoria Observations of New Vegetable Fossils of the Auriferous Drifts,
 1874 and 1883, 2 parts; Report of Progress, Nos. 2 to 6, 1874-80, 5 copies.
 Hand-books of Commercial Products, Indian Section, Imperial Institute, Series Nos. 1 to 10
 and 12, 1892-93, 11 copies.
 Handel's Geographie, 1890-91.
 Haraprasad Shastri—Notices of Sanskrit Manuscripts, Vol. 10, Part 2, 1892.
 Holland, T. H.—Preliminary Report on the Iron Ores and Iron Industries of the Salem District,
 1892, 2 copies.
 Imperial Institute—Year Book, 1892.
 Indian Engineering—An Illustrated Weekly Journal, 1892.
 India Office List, 1892.
 Ireland, A.—Address on the Moral Influence of Free Libraries, Manchester, 1892.
 Jacob, C. S. S.—Jeypore Portfolio of Architectural Details, Parts 1 to 6, 1890, 6 copies.
 Jathisangrahasaram in Tamil, 1872.
 Journal of the Society of Arts, Vol. XI, No. 2054, 1892.
 Kalyani Inscriptions erected by King Dhammaceti at Pegu, Text and Translation, 1892.
 List of Notifications and Rules revised up to 31st December 1891, issued and published under
 the Provisions of Acts and Regulations in Madras, 1892.
 Logan, W.—A Collection of Treaties, Engagements and other Papers of Importance relating
 to British Affairs in Malabar, Vol. 3, 2nd edition, 1891.
 London University Calendar for the years 1870, 1876 and 1878, 3 vols.
 Madras Christian College Magazine.—Vol. 10, Nos. 1, 3, 5, 7, 8 and 9, 1892-93, 6 parts.
 Madras University Calendar, 1892-93, 2 vols.
 Monograph on the Pottery and Glass Industries of the Punjab, 1890-91.
 Muttrich, A.—Forstlich Meteorologischen Stationen, Nos. 1 to 6, 1892, 6 copies.
 Muybridge, E.—Science of Animal Locomotion Zoopraxography, 2 copies.
 North-Western Provinces and Oudh.—Minutes of the Managing Committee, 1889-91, 1891-92,
 2 vols.
 Ogilby, J. D.—Catalogue of Australian Mammals, Australian Museum, Sydney, 1892.
 Owen's College Calendar, 1874-75.
 Pandian, Rev. T. B.—Slaves of the Soil in Southern India, 1892.
 Peter, A.—Wandtafel zur Systematik Morphologie und Biologie der Pflanzen für Uni-
 versitäten und Schulen, 1 sheet large folio.
 Poudaung Inscription erected by King Sinbyuwin, in 1874, A.D. 1891.
 Pratapa Chandra Ray—Mahabharata, Parts 70 to 77, 1891-92, 8 copies.

- Preservation of National Monuments.—Second and Third Reports of the Curator of Ancient
 Monuments in India, 1882-83, 1883-84, 2 copies.
 Rainfall Data of India, 1891.
 Ramsay, E. P.—Records of the Australian Museum, Vol. 2, Nos. 1 to 4, 1892-93, 4 copies.
 Rare Photographic Memorials of the Mutiny, 1892.
 Royal Gardens, Kew—Bulletin of Miscellaneous Information, 1 copy for 1891, 2 copies for
 1892, 3 copies.
 Royal Institute of British Architects—Journal of Proceedings, New Series, Vols. 1 to 3, and
 Vols. 5 to 8, 1885, 1887, 1889 to 1892, 7 vols; Kalendar, 1892-93, 2 vols; Transactions, Vols.
 4 to 8, 1888-92, 5 vols.
 Royal Irish Academy Transactions—Vol. 30, Parts 3 and 4, 1892-93, 2 parts; Proceedings,
 Vol. 2, No. 2, 1892.
 Rules of the Bangalore Library, 1892.
 Rust, D.—Contributions to Canadian Micro-Palaeontology, 1892.
 Sarat Chandra Mitra—Biographical Sketches of Indian Antiquarians, 2 numbers.
 Schlagintweit, E.—Indien in Wort und Bild, 1890-91, 2 vols.
 Scientific Results of the Second Yarkand Mission, 1878-91.
 Slater, W. L.—List of the Batrachia in the Indian Museum, 1892.
 Shanar Vigarpa Vinavidai in Tamil, 1891.
 Smith, C. M.—Madras Meteorological Results, 1861-90
 Smith, C. M.—Madras Observatory Meridian Circle Observations, 1871-75 and 1876, 1892.
 Smithsonian Report, Washington, 1890.
 Spink and Sons.—Numismatology, Vol. 1, No. 7, 1892.
 Srinivasa Raghavaiyengar, S.—Memorandum on the Progress of the Madras Presidency during
 the last 40 years of British Administration, 1892.
 Stein, M. A.—Kalhanas Rajatarangini in Sanskrit, Vol. I, 1892.
 Strachey, J.—Hastings and the Rohilla War, 1892, 2 copies.
 Theobald, F. V.—An Account of British Flies (Diptera), Vol. I, Parts 5, 6, 7 and 8, 1892-93,
 4 copies.
 Transactions of the Seventh International Congress of Hygiene, Vol. II, Indian Hygiene and
 Demography, 1892.
 United States National Museum—Bulletin No. 41, Published Writings of Dr. Charles Girard,
 1891; Bulletin No. 42, Preliminary Descriptive Catalogue of the Systematic Collections in
 Economic Geology and Metallurgy, 1891; Reports, 1889.
 Vannikula Vilakkam—English and Tamil, 1891, 2 vols.
 Victoria, 1883—Mineral Statistics of Victoria, 1892.
 Victoria, 1883—Report of the Chief Inspector of Mines to the Honorable the Minister of Mines,
 1882; Reports of the Mining Surveyors and Registrars, Quarters ended 30th March and
 30th June 1883, 2 copies.
 Watt, G.—Dictionary of the Economic Products of India, Vol. 6, Part 1, 1892, Vols. 1 to 4,
 2 parts in Vol. 5, interleaved, Ed. 1889-91, 7 vols.
 Whitaker, W.—Memoirs of the Geological Survey of England and Wales, Geology of London,
 Vol. I, 1889.
 Wingham.—A Report on the Analysis of Oriental Metal Work, &c., in the South Kensington
 Museum, 1892.
 Wytsman, P.—Entomology, No. 9.

Periodicals.

- Asiatic Society of Bengal—Journal, 8 parts, and Proceedings, 8 parts.
 Bombay Natural History Society—Journal, 4 parts.
 Epigraphia Indica, 3 parts.
 Fort St. George Gazette, 48 issues.
 Geological Survey of India—Memoirs, 1 part, and Index of the First Twenty Volumes and
 Records, 4 parts.
 Hindu Reformer—A Monthly Journal, Vol. 8, Nos. 1 to 7, 1892-93, 7 copies.
 Indian Antiquary, 13 issues.
 Indian Art Journal, 4 parts.
 London Royal Society Proceedings, 14 parts.
 Madras Ports—Imports and Exports, 11 numbers.
 Memoirs of the Geological Survey of India—Index of the genera and species described in the
 Palaeontologia Indica.
 Musical Herald, 9 issues.
 Oesterreichische Monatsschrift für den Orient, 12 parts.
 Pandit—Sanskrit Literature, 15 monthly issues.

D.

MINERAL GALLERY, GOVERNMENT CENTRAL MUSEUM.

EXTRA TERRESTRIAL OBJECTS.

METEORITES.

METEORIC STONES AND IRON FALLEN OR FOUND ON THE FOLLOWING DATES :—

Ensisheim, France, 1492.
 Kraonjars, Siberia, 1775.
 Toluca, Mexico, 1784.
 Krakhut, Benares, 1798.
 Stannern, Moravia, 1808.
 Elbogen, Bavaria, 1811.
 Lenarto, Hungary, 1815.
 Juvenar, France, 1821.
 Bokkevelt, The Cape, 1838.
 Namianthal, South Arcot, 1886.
 Kakangari, Salem district, 1890.

MODELS OF METEORIC STONES FALLEN IN INDIA.

Daruba, Pattiala, 1815.
 Bittoor, Allahabad, 1822.
 Busta, North-West Provinces, 1852.
 Segowlee, India, 1853.
 Peprasse, India, 1861.
 Nellore, Madras Presidency, 1852.
 Nine more models without labels. Total, 26 specimens.

TERRESTRIAL SPECIMENS.

MINERALS.

108 kinds of minerals, of which 73 were exhibited from Southern India, the remaining being index specimens from elsewhere; bracketted in the list.

Native Elements.

						System of crystallisation.	Number of specimens.
Gold	..	..	..	..	..	Is.	15
(Silver)	..	..	..	..	..	Is.	1
Copper	..	..	..	..	..	Is.	2
(Osmiridium)	..	..	..	..	..	He.	1
(Platinum)	..	..	..	..	..	Is.	1
(Iron)	..	..	..	..	..	Is.	1
(Amalgam)	..	..	..	..	..	Is.	1
(Arsenic)	..	..	..	..	..	He.	2
(Bismuth)	..	..	..	..	..	He.	1
Sulphur	..	..	..	..	..	Or.	4
Diamond	..	..	..	..	..	Is.	2
Graphite	..	..	..	..	..	He. ?	11

Sulphides.

(Argentite)	..	..	..	..	..	Is.	1
(Zinoblende)	..	..	..	..	..	Is.	1
(Cinnabar)	..	..	..	..	..	He.	1
Galena	..	..	..	..	..	Is.	17
Copper pyrites	..	..	..	..	..	Is.	5
Iron pyrites	..	..	..	..	..	Is.	11
(Orpiment)	..	..	..	..	..	Or.	2
(Stibnite)	..	..	..	..	..	Or.	1

System of
crystallisation.

Number of
specimens.

Oxides.

Corundum	..	..	..	..	..	He.	24
Spinel	..	..	..	..	..	Is.	3
Haematite	..	..	..	..	..	He.	122
Braunite	..	..	..	..	..	Te.	2
Magnetite	..	..	..	..	..	Is.	269
Chromite	..	..	..	..	..	Is.	7
Göthite	..	..	..	..	..	Or.	2
Limonite	..	..	..	..	..	..	107
Manufactured iron and steel	..	..	..	..	..	..	292
Manganite	..	..	..	..	..	Or.	12
Pyrolusite	..	..	..	..	..	Or.	6
Quartz	..	..	..	..	..	He.	75
Agate, etc.	..	..	..	..	..	..	162
Opal	..	..	..	..	..	..	26
Rutile	..	..	..	..	..	Te.	1
Tinstone	..	..	..	..	..	Te.	4
Zircon	..	..	..	..	..	Te.	2

Silicates.

Artificial silicate—Glass	..	..	..	..	..	..	8
Augite (Coccolite)	..	..	..	..	..	Mo.	1
(Rhodonite)	..	..	..	..	..	Mo.	1
Hornblende	..	..	..	..	..	Mo.	9
(Tremolite)	..	..	..	..	..	Mo.	1
Actinolite	..	..	..	..	..	Mo.	4
Asbestos	..	..	..	..	..	Mo.	6
Beryl	..	..	..	..	..	He.	2
(Olivine)	..	..	..	..	..	Or.	3
Garnet	..	..	..	..	..	Is.	31
(Cinnamon stone)	..	..	..	..	..	Is.	2
(Pyrope)	..	..	..	..	..	Is.	1
(Idocrase)	..	..	..	..	..	Te.	2
(Lapis lazuli)	..	..	..	..	..	Is.	1
Mica	..	..	..	..	..	Mo.	40
Biotite	..	..	..	..	..	Mo.	1
(Lepidolite)	..	..	..	..	..	Mo.	1
Orthoclase	..	..	..	..	..	Mo.	4
Adularia	..	..	..	..	..	Mo.	5
Microcline	..	..	..	..	..	Tr.	2
Clevelandite	..	..	..	..	..	Tr.	1
Albite	..	..	..	..	..	Tr.	10
Oligoclase	..	..	..	..	..	Tr.	1
(Indianite)	..	..	..	..	..	Tr.	1
Labradorite	..	..	..	..	..	Tr.	6
Felspar, not named.	..	..	..	..	..	..	10
Felspar, decomposing	..	..	..	..	..	..	2
Chlorite	..	..	..	..	..	Mo.	1
Talc	..	..	..	..	..	Mo. ?	10
Steatite	..	..	..	..	..	..	23
Meerschaum	..	..	..	..	..	..	2
Serpentine	..	..	..	..	..	..	15
Verdantique	..	..	..	..	..	..	1
Kyanite	..	..	..	..	..	Mo.	6
Staurolite	..	..	..	..	..	Or.	3
Tourmaline	..	..	..	..	..	He.	11
(Topaz)	..	..	..	..	..	Or.	1
Epidote	..	..	..	..	..	Mo.	9

Hydrous silicates.

Prehnite	..	..	..	..	..	Or.	4
Natrolite	..	..	..	..	..	Or.	4
Mesolite, fibrous	..	..	..	..	..	..	1
Thomsonite	..	..	..	..	..	Or.	3
Chabazite	..	..	..	..	..	He.	2
Stilbite	..	..	..	..	..	Or.	8
Pinite	..	..	..	..	..	..	1
Kaolin	..	..	..	..	..	..	24

						System of crystallisation.	Number of specimens.
<i>Titanates, &c.</i>							
(Sphene)	..	..	..	..	..	Mo.	1
(Wolframite)	..	..	..	..	..	Mo.	1
(Wulfenite)	..	..	..	..	..	Te.	1
<i>Sulphates.</i>							
Barite	..	..	..	..	..	Or.	11
Celestine	..	..	..	..	..	Or.	3
(Anhydrite)	..	..	..	..	..	Or.	2
Gypsum	..	..	..	..	..	Mo.	20
(Alunite)	..	..	..	..	..	Is.	1
<i>Phosphates.</i>							
Apatite	..	..	..	..	..	He.	4
Turquoise	..	..	..	..	..	..	1
<i>Carbonates.</i>							
Calcite	..	..	..	..	..	He.	64
Magnesite	..	..	..	..	..	He.	9
Siderite	..	..	..	..	..	He.	2
(Calamine)	..	..	..	..	..	He.	2
Dolomite	..	..	..	..	..	He.	3
(Aragonite)	..	..	..	..	..	Or.	5
(Witherite)	..	..	..	..	..	Or.	1
(Strontianite)	..	..	..	..	..	Or.	1
(Cerussite)	..	..	..	..	..	Or.	2
Malachite	..	..	..	..	..	Mo.	14
Azurite	..	..	..	..	..	Mo.	2
<i>Nitrates, Chlorides, &c.</i>							
Nitre	..	..	..	..	..	Or.	1
Rock salt	..	..	..	..	..	Is.	2
(Fluorspar)	..	..	..	..	..	Is.	3
<i>Of Vegetable origin.</i>							
Coal	..	..	..	..	..	..	4
(Bitumen)	..	..	..	..	..	..	3
Resinite	..	..	..	..	..	..	1
Peat	..	..	..	..	..	..	1

ROCK SPECIMENS.

GENERAL COLLECTION OF ROCKS.

*Eruptive or Igneous Rocks.**Orthoclase group.*

Granite	..	..	..	..	..	..	70
Pegmatite	..	..	..	..	..	..	14
Granulite	..	..	..	..	..	..	1
Epidote and Pistacite granite	..	..	..	..	..	..	8
Syenite	..	..	..	..	..	..	14
Porphyry	..	..	..	..	..	..	9
Felsite	..	..	..	..	..	..	3

Plagioclase group.

Basalt	..	..	..	..	..	..	7
Dolerite	..	..	..	..	..	..	18
Porphyritic dolerite	..	..	..	..	..	..	2
Trap, general term	..	..	..	..	..	..	16
Greenstones, general term	..	..	..	..	..	..	3
Diorite	..	..	..	..	..	..	13

Serpentine group.

Serpentine	..	..	..	..	..	..	5
Potstone and stentite	..	..	..	..	..	..	5
Collection of potstone articles	..	..	..	..	..	..	25

Metamorphic Rocks.

Gneiss (many of these rocks require microscopic examination).	186
Granitoid gneiss	5
Epidote rock	2
Staurolite rock	1
Mica shist	14
Hornblende shist	7
Talcose shist	15
Chlorite shist	12
Quartzose shist	5
Slate, ordinary	8
Clayslate	8
Marble and serpentinous limestone in large slabs	20
Limestones and marbles of various colours and patterns, more or less crystalline	60
Quartzite	36

Vein Rocks.

Quartz from veins in Southern India	69
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SEDIMENTARY ROCKS ARRANGED ACCORDING TO MINERAL CONSTITUTION INDEPENDENT OF AGE.

Quartzose Rocks.

Conglomerates	20
Breccias	7
Grits	4
Sandstones	68
Quartzites	27

Argillaceous Rocks.

Kaolin	7
Clays of various colours	26
Shales and shaly clays	33
Laterites	24
Peaty shales and clays	7
Peat	2

Calcareous Rocks.

Limestone	40
Cement, samples of cement	3
Dolomite	9
Marl	2
Shell limestone	8
Travertine	10
Kankar	7
Gypsum	1
Lithographic limestone and shell limestone in large slabs	14

SPECIMENS ILLUSTRATING GEOLOGICAL PHENOMENA.

Slab of limestone showing the bedding	1
Slab of limestone with cast of sun cracks	1
Slab of sandstone showing ripple marking	1
Slab of sandstone showing concentric markings	1
Slabs of sandstone with dendritic markings	3
Septaria with veins, weathered into segments	2
Casts of salt crystals in sandstone	1
Slickenslide on quartz	1
Jointing, rhombic prisms of shist, sandstone and shale	3
Weathering. A piece of limestone	1
Gypsum with sharp edges	1
Pebbles with veins	5
Conglomerate of large pebbles	1
Ice scratched pebbles from modern glacier	4
Floor of modern glacier	1
Limestone from old moraine	1

THE GEOLOGICAL FORMATIONS OF SOUTHERN INDIA IN
CHRONOLOGICAL ORDER.*Carboniferous.*

Kamptee beds near Nagpur.	Specimens presented by Rev.	Number of specimens.
Hislop. Fossil plants		48

Cretaceous.

The Cretaceous rocks of Southern India, Trichinopoly district.

Coelenterata (Corals)	.. .. .	10
Echinodermata	.. .. .	25
Terebratula	.. .. .	2
Mollusca—		
Lamellibranchiata	.. .. .	216
Gasteropoda	.. .. .	91
Cephalopoda Nautilus	.. .. .	80
Ammonitidae	.. .. .	250
Belemnites	.. .. .	10
Teeth of fish	.. .. .	2
Fossil fish	.. .. .	1
Teeth of Saurian	.. .. .	2
Plates and bones of Saurian	.. .. .	4
Collected before 1892 from Cretaceous of Trichinopoly area (mostly mollusca)	.. .. .	96
Nodules, concretions and minerals from the cretaceous rocks of Trichinopoly	.. .. .	120

Post Cainozoic.

Alluvial tin gravel of Lower Burmah	.. .. .	40
Sub-fossil reef of Pámban	.. .. .	60

The following tabular statement represents the collection from European fossiliferous strata arranged for students.

The table shows the number of rock specimens, plants and animal remains, the latter divided into thirteen sub-kingdoms and classes. The geological periods are enumerated from above downwards.

	Rock specimens.	Plant remains.	Protozoa.			Echinodermata.	Annelida.	Crustacea.	Mollusca.	Vertebrata.			Total.
			Nummulites.	Sponges.	Corals.					Lamelli-branchiata.	Gastropoda.	Cephalopoda.	
Miocene	..	..	..	..	3	..	..	..	35	62	..	..	..
Eocene	..	..	..	..	3	..	..	..	31	76	..	..	108
Chalk	..	..	..	..	3	49	3	2	37	..	12	..	123
													134
Greenland	..	..	..	..	..	..	..	..	..	..	..	..	..
Woolden	..	..	..	..	..	..	..	..	..	..	..	..	..
Upper oolite	..	..	..	..	..	..	..	..	..	..	..	..	89
Middle oolite	..	..	..	..	..	..	..	..	..	..	..	..	14
Lower oolite	..	..	..	..	..	..	..	..	..	..	..	..	14
Liass	..	..	..	..	..	..	..	..	..	..	..	..	74
Trias	..	..	..	..	..	..	..	..	..	..	..	..	133
Permian	..	..	..	..	..	..	..	..	..	..	..	..	100
Carboniferous	..	..	..	..	..	..	..	..	..	..	..	..	49
Devonian	..	..	..	..	..	..	..	..	..	..	..	..	31
Total specimens	144	87	5	10	39	98	6	20	174	264	172	122	1,207

SUMMARY.

Number of Specimens.

Extra terrestrial, meteorites	.. .. .	26
<i>Terrestrial.</i>		
Minerals, local, 73 species	.. .. .	1,600
Minerals, foreign, 85 species	.. .. .	50
<i>Rocks, all from India.</i>		
Eruptive (orthoclase, plagioclase and serpentine groups)	.. .. .	213
Metamorphic and vein rocks	.. .. .	448
Sedimentary rocks (quartzose, argillaceous and calcareous)	.. .. .	319
Geological phenomena illustrated	.. .. .	28
Indian geological formations, arranged chronologically,		
Kampti's	.. .. .	48
Trichinopoly cretaceous	.. .. .	909
Burmah alluvial	.. .. .	40
Pámban reef	.. .. .	60
Total	.. .. .	3,741
European fossils, arranged according to formations chronologically	.. .. .	1,207
Total	.. .. .	4,948

H. WARTH,

1st March 1893.

Offg. Supt., Govt. Central Museum.

E.

NOTES ON MINERALS.

Corundum.

The following is a list of localities from which samples of corundum are at present in the Government Central Museum, Madras :—

1. Vizagapatam district, Kodur.
2. Gódayari district, hills north-west of Rajahmundry.
3. Kistna district, Guntúr.
4. Kurnool district, Munagala, Ramalokot taluk.
5. Bellary district.
6. North Arcot district, Kuppam.
7. North Arcot district, Timmajammas estate near Chittoor.
8. Salem district, Kavandampatti.
9. Salem district, Pennagaram in the Dharmapuri taluk, presented by Sriramulu Raju, Contractor of Madras.
10. Salem district, Sithampundi.
11. Salem district, Solasiramani=Sholasigamany.
12. Salem district, Yelagiri hills.
13. Coimbatore district, crystals.
14. Coimbatore district, banks of the Cauvery.
15. Coimbatore district, Sholasigamany.
16. Coimbatore district, presented by H. G. Turner, Esq.
17. Coimbatore district, Gopichettipalayam.
18. Coimbatore district, Shegrispollaim and Karootapollaim of Palladam taluk.
19. Coimbatore district, Pasur, presented by W. T. Hamilton Holmes, Esq.
20. South Canara district.
21. South Canara district, Kemmar village, Uppinangudi taluk.
22. Mysore Province, Hunsur, in block 300 lb.
23. Mysore Province, hills near Bangalore.
24. Mysore Province, Mallakotah (French Rocks near Seringapatam, presented by Sri Rmulu Raju, Contractor of Madras.

25. Mysore Province, Mysore.
26. Mysore Province, Saringamandahalli.
27. Mysore Province, Narnapeenahalli.
28. Mysore Province, Kallully, Mandaya taluk.
29. Mysore Province, Singina Marina Halli near Hunsur.
30. Coorg Mysore Province, Kushalnagar.

More attention has of late been directed to the deposits of corundum in the Madras Presidency as a valuable article of export and on account of its possible use for the manufacture of aluminium at some future date. According to the above list the collection contains now specimens from 30 different localities, and there is a prospect of this number being considerably increased since the Board of Revenue have issued a circular inviting District officers to send specimens from all new localities that may come to their notice. The occurrence of corundum is limited to the area of metamorphic rocks, but a glance at the geological map of this Presidency issued with the last annual report shows that these rocks occupy far the largest portion of the country. At present the specimens in the Museum come from 9 districts—Vizagapatam, Góddá-vari, Kistna, Kurnool in the north and the North Arcot, Salem, Coimbatore, South Canara further south. Corundum has also been reported from Ganjam, Anantapur, and the principality of Travancore, also from H. H. the Nizam's dominions and from Coorg. The southernmost part of the Presidency comprising 6 districts is entirely unrepresented.

I have been able to examine one of the localities where corundum occurs as usual in isolated crystals scattered through gneiss and other metamorphic rock. This was on a square mile of waste lands south of the village of Sithampundi in the Salem district. It is 2 miles E.S.E. from Sola siramani on the Cauvery river and also in the Salem district. The principal rock was a grey rock consisting of the quartz and hornblende with a little felspar which weathers easily; there are also beds of hornblende rock and garnetiferous shist, veins of quartz and lenticular masses of flesh-colored felspar a yard in thickness. Greenish corundum was obtained from shallow excavations scattered over the area of exposed shist; less frequent a red kind of corundum was found and followed up by deeper excavations.

No work was in progress during my visit, but a trial excavation in loose ground gave 1 part of corundum to 300 parts of matrix. The crystals were only half an inch in diameter. But it is known that larger crystals of about 1 inch diameter are also found, and very likely there are much richer places than the one I was able to test. Samples of the greenish corundum obtained by the Collector of Salem were good cleavage pieces of the rhombohedral form, measured 86°. Dr. Max Bauer, Professor of Mineralogy, Marburg University, measured a number of them and found the angle always a few minutes above 86°. The fine net-work of lines on all the surfaces are due to twinning planes parallel to the three faces of the rhombohedron and they afford easy cleavage. Some rough tapering hexagonal prisms occurred also. Magnetite, calcite and hornblende were mixed with the corundum which the people had collected. The white powder with which many of the specimens were coated proved to be carbonate of lime. The pieces of red corundum were smaller but had also the characteristic striation or net work of twinning lines. They differed in nothing from precious rubies except by their want of transparency. In fact a few small transparent pieces were also obtained from the neighbourhood by the district authorities. A small number of red or violet red crystals were examined, and as some of them showed inferior hardness and apparently octohedral form, they were all supposed to be spinel. A later examination of 10 small transparent crystals under the polarizing microscope showed that there were 3 spinels, 1 garnet, 6 rubies, the latter, however, not of sufficient size or quality to be sold as gems.

Another corundum locality which I was able to pass through is the taluk of Hunsur, in Mysore territory, about 30 miles west of Mysore city. Mr. F. W. Petrie Hay had corundum collected under a lease of the Mysore Government from a number of villages to the south and west of the town of Hunsur. Very excellent crystals of yellowish corundum with a brown weathered surface were collected from the fields. Some tapering hexagonal prisms up to 5 inches length and a cubical piece of about 4 inches side were amongst the specimens which Mr. Hay was kind enough to present to the Museum. But what struck me most at the very beginning were large blocks of quarried corundum which Mr. Hay had obtained. I considered them as of the greatest importance, because a much larger and more continuous yield would be expected from them than from the smaller scattered crystals.

The quality of the quarried pieces is very little inferior to that of the crystals. I found the specific gravity of the large crystals 4.02 and of the rock corundum 3.80. Mr. Hay presented to the Museum a block of this corundum weighing 300 lb. It appears that this rock corundum occurs in blocks 2 feet thick arranged in lines in the metamorphic rocks.

There is yet a possibility of beauxite being discovered and supplied at a lower rate for the manufacture of aluminium. It has lately been shown that beauxite occurs near Marburg in Germany as a product of alteration from basalt similar in origin to the kaolins and certain laterites which abound in India. The price of beauxite from near Marburg is quoted at eight Rupees a ton, whilst corundum costs in India eighty Rupees a ton. The aluminium works near Schaffhausen pay eighteen Rupees a ton for the beauxite delivered at their factory.

THE PHOSPHATIC NODULES OF THE TRICHINOPOLY DISTRICT.

Under instructions from the Government of Madras, one ton of nodules were sent to Her Majesty's Secretary of State, and the following chemical analysis obtained (omitting second places of decimals and some other details):—

	Voelcker.	J. F. King.
Phosphoric acid *	26.0	27.0
Lime	45.5	46.9
Alumina and iron oxide	5.8	4.0
Magnesia, sulphuric acid, &c.	1.0	3.2
Fluorine and alkalis	4.8	...
Silica	5.3	2.8
Carbonic acid †	7.2	10.3
Organic matter, moisture, &c.	4.4	5.8
	100.0	100.0

* Equal to tribasic phosphate

† Equal to carbonate of lime

We learn from Dr. Voelcker's report that the carolina phosphates at present shipped from America to England do not contain more phosphate of lime than the above, but they contain less alumina and iron oxide and less carbonate. Dr. Voelcker recommends the direct use of these phosphates without manufacturing them into superphosphate. To manufacture superphosphate profitably would require large quantities, more than 60,000 tons. During my last visit I have been able to ascertain that the entire area covered by phosphatic nodules equals 10 square miles, and that about 4,000 tons of nodules are lying more or less loosely on the surface. From the first I observed that the nodules on the surface had been accumulated by the washing away of the cretaceous shales in which they were embedded. The proportion of nodules in the shales, wherever I had an opportunity of examining the latter, appeared to me too small for profitable working. *Prima facie* the existence of a superficial deposit of phosphates spread over such a large surface is certain to rouse expectation of more extensive underground deposits.

The excavation of soft shales enclosing the nodules is also very cheap comparatively, and although richer underground layers have not been observed nor any indications of such, yet it is impossible to say absolutely that there are none. It is therefore proposed to examine in detail one or two complete underground sections across the band of nodules. These sections are expected to settle the question of a possible larger supply definitely and they will be taken in hand as soon as possible.

IRON.

Iron ores.—As regards the possible utilization of the rich iron ores of this Presidency on a larger scale than the still existing local industry, I would refer to the publication of Mr. T. H. Holland's pamphlet (Preliminary report on the Iron ores and Iron industries of the Salem District).

Mr. Holland has shown in figures how the scarcity of fuel prevents the development of this highly desirable industry. As an example of the scarcity of fuel I might mention the fact that at this present moment the Kolar Gold Companies in the heart of Southern India use English coal for their engines, and yet it is with English iron and steel brought to this country for mere nothing that the Indian iron has to compete. The fuel difficulty remains an obstacle even should measures be taken to reduce the quantity of charcoal to a minimum. Wood-fuel or coal used as gas in reverberatory furnace would also cause an economy of fuel, but it would absorb all waste heat which in other cases would be available for steam-power. Water-power would have to be on the spot or be conveyed at great cost by electricity for working up the metal. As regards Mr. Chatterton's proposal of using electricity only without any fuel, this method would just as easily produce aluminium and with the electricity from waterfalls available it would pay better to make the former metal than even the most precious steel.

The only prospect under present circumstances of doing anything with the iron ore must be based upon their abundance, richness and quality. Their abundance and richness stands undoubted. As regards the quality it is of the greatest importance that elaborate chemical analysis should be made. We require to know first of all whether the amount of phosphorus is so small as not to require elimination for the best quality of iron and steel. Upon this condition hinges at present the possibility of working with exceptional economy of fuel. This point will be decided by the work which Mr. T. H. Holland has started. I am informed that analysis of all the specimens collected on his late tour through the iron districts are being made in England. It would be very satisfactory if the absence of phosphorus in some rich

deposits would be established. The direct process of steel-making in the Salem district indicates freedom from phosphorus, whilst the manufacture of Wootz steel in other districts points rather to the contrary, wrought iron being first produced and afterwards made into cast steel. For all this we must await the promised chemical analysis which will give the most ample and unerring information.

F.

The following is a ferro cyanide picture of the Shark rhinodon typicus set up in the fish gallery. The bar shown resting against the fish is of three feet length. It was cast ashore, dead at Madras, in the year 1889, and temporarily stuffed and has now been more carefully preserved.

Specimens of this species are rare. Günther in his study of fishes says: "It is perfectly harmless, its teeth being extremely small and numerous, placed in broad bands. It has been stated to feed on tang—an observation which requires confirmation." The stomach of this specimen was examined, but found empty. Smith in his illustrations of the zoology of South Africa gives a picture of the fish and says the following about its food: "When our shark proceeds to feed, the first step it probably takes is to open its jaws to their full extent in order to permit the mouth and pharynx to become filled with sea water. On that being accomplished, the jaws are then probably closed in order that the water shall, by muscular effort in the pharynx, be propelled through the tubes in the branchiæ and forced thus to leave behind it whatever mollusca it may chance to contain."

The measurement of the dimensions makes the specimen 70 cubic feet, representing in sea water a weight of two tons. The weight of the stuffed specimen, with the skin and model together, is 6 cwt. The following measurements were kindly supplied by Dr. A. G. Bourne who took them when the fish was still lying at the beach:—

	INCHES.
Total length 22 feet	or 264
Root of 1st dorsal (fin) to upper jaw	118
Anterior edge of 1st dorsal	22
Base of 1st dorsal	24
Distance between 1st and 2nd dorsal	27
Anterior edge of 2nd dorsal	11½
Base of 2nd dorsal	10½
Length of upper caudal lobe	60
Length of lower "	30
Anterior edge of pectoral fin	38
First branchia to anterior edge of pectoral fin	15
Breadth of pectoral fin at base	20
Length of 1st gill opening	28
Length of 2nd "	28½
Length of 3rd "	21
Length of 4th "	20
Length of 5th "	17
Eye diameter	1½
Spiracle	¾ inch by 1
Mouth	30
Teeth, lower jaw	14 rows.
Tip of snout to 1st branchia	40
Tip of snout to eye	10
Eye to spiracle	4

RHINODON TYPICUS.

SURVEY OFFICE, MADRAS.
1893.

G.

LIST OF THE MAMMALS IN THE MAMMAL GALLERY.

All from Southern India.

Blanford's No.	Latin names.	English names.	No.
<i>Order Primates.</i>			
5. <i>Macacus silenus</i> ...	...	The lion-tailed monkey	1
10. <i>Macacus sinicus</i> ...	...	The bonnet monkey	1
15. <i>Semnopithecus hypoleucus</i> ...	...	The Malabar langur	1
16. <i>Semnopithecus johnei</i> ...	...	The Nilgiri langur	1
27. <i>Loris gracilis</i> ...	...	The slender loris	2
<i>Order Carnivora.</i>			
29. <i>Felis tigris</i> ...	...	The tiger	1
30. <i>Felis pardus</i> ...	...	The leopard or panther	3
35. <i>Felis viverrina</i> ...	...	The fishing cat	1
36. <i>Felis bengalensis</i> ...	...	The leopard cat	1
41. <i>Felis chaus</i> ...	...	The jungle cat	1
42. <i>Felis caracal</i> ...	...	The caracal	1
44. <i>Cynelurus jubatus</i> ...	...	The hunting leopard	1
46. <i>Viverra civettina</i> ...	...	The Malabar civet-cat	1
48. <i>Viverricula malaccensis</i> ...	...	The small Indian civet	2
51. <i>Paradoxurus niger</i> ...	...	The Indian palm-civet	2
54. <i>Paradoxurus jerdoni</i> ...	...	The brown palm-civet	1
60. <i>Herpestes mungo</i> ...	...	The common Indian mongoose	1
62. <i>Herpestes fuscus</i> ...	...	The Nilgiri brown mongoose	1
64. <i>Herpestes vitticollis</i> ...	...	The stripe-necked mongoose	1
66. <i>Hyæna striata</i> ...	...	The striped hyæna	1
69. <i>Canis aureus</i> ...	...	The jackal	1
70. <i>Cyon dukhunensis</i> ...	...	The Indian wild dog	2
72. <i>Vulpes bengalensis</i> ...	...	The Indian fox	1
77. <i>Mustela flavigula</i> ...	...	The Indian marten	1
89. <i>Mellivora indica</i> ...	...	The Indian ratel	1
92. <i>Lutra vulgaris</i> ...	...	The common otter	2
95. <i>Lutra leptonyx</i> ...	...	The clawless otter	1
100. <i>Melursus ursinus</i> ...	...	The sloth-bear or Indian bear	1
<i>Order Insectivora.</i>			
101. <i>Tupaia ellioti</i> ...	...	The Madras tree-shrew	1
108. <i>Erinaceus micropus</i> ...	...	The South Indian hedgehog	2
118. <i>Crocidura cærulea</i> ...	...	The grey-musk shrew	2
120. <i>Crocidura bidiana</i> ...	...	Bidie's shrew	1
125. <i>Crocidura perrotteti</i> ...	...	The Indian pigmy shrew	1
<i>Order Chiroptera.</i>			
134. <i>Pteropus medius</i> ...	...	The Indian fruit-bat or flying-fox	2
138. <i>Cynopterus marginatus</i> ...	...	The short-nosed fruit-bat	1
150. <i>Rhinolophus affinis</i> ...	...	The allied horse-shoe bat	1
164. <i>Hipposiderus speoris</i> ...	...	Schneider's leaf-nosed bat	1
194. <i>Nycticejus kuhli</i> ...	...	The common yellow bat	1
213. <i>Cerivoula picta</i> ...	...	The painted bat	2
220. <i>Taphozous longimanus</i> ...	...	The long-armed sheath-tailed bat	1
222. <i>Taphozous saccolæmus</i> ...	...	The pouch-bearing sheath-tailed bat	1
223. <i>Rhinopoma microphyllum</i> ...	...	The long-tailed bat	1
225. <i>Nyctinomus plicatus</i> ...	...	The Indian wrinkled-lipped bat	1

Blanford's No.	Latin names.	English names.	No.
<i>Order Rodentia.</i>			
239.	<i>Sciurus indicus</i> ...	The large Indian squirrel ..	2
253.	<i>Sciurus palmarum</i> ...	The palm-squirrel or common striped squirrel ...	2
263.	<i>Platacanthomys lasiurus</i> ...	The Malabar spiny mouse ...	1
264.	<i>Gerbillus indicus</i> ...	The Indian gerbille or antelope rat ...	3
272.	<i>Mus rattus</i> ...	The common Indian rat ...	2
274.	<i>Mus decumanus</i> ..	The brown rat ...	2
282.	<i>Mus musculus</i> ...	The common house-mouse ...	2
287.	<i>Mus buduga</i> ...	The common Indian field-mouse ...	2
290.	<i>Mus mettada</i> ...	The metad rat or soft-furred field-rat ...	1
295.	<i>Nesocia bengalensis</i> ...	The Indian mole-rat ...	2
296.	<i>Nesocia bandicota</i> ...	The bandicoot-rat ...	3
315.	<i>Hystrix leucura</i> ...	The Indian porcupine ...	1
319.	<i>Lepus nigricollis</i> ...	The black-naped hare ...	1
351.	<i>Hemitragus hylocrius</i> ...	The Nilgiri wild goat ...	1
357.	<i>Antelope cervicapra</i> ...	The Indian antelope or black buck ...	2
362.	<i>Cervulus muntjac</i> ...	The rib-faced deer or barking deer ...	3
368.	<i>Cervus axis</i> ...	The spotted deer ...	1
371.	<i>Tragulus meminna</i> ...	The Indian chevrotain or mouse deer ...	3
374.	<i>Sus cristatus</i> ...	The Indian wild boar ...	1

Order Cetacea.

390.	<i>Steno plumbeus</i> ...	The plumbeous dolphin ...	1
391.	<i>Steno perniger</i> ...	Elliot's dolphin ...	1

Order Edentata.

399.	<i>Manis pentadactyla</i> ...	The Indian pangolin ...	2
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LIST OF THE BIRDS IN THE BIRD GALLERY.

*All from Southern India.**Order Raptores—Birds of Prey.*

Jerdon's No.	Latin names.	English names.	No.
2.	<i>Otogyps calvus</i> ...	Black vulture ...	1
5.	<i>Gyps bengalensis</i> ...	Common brown vulture or white-backed vulture ...	1
6.	<i>Neophron perenopterus</i> ...	White scavenger vulture ...	2
8.	<i>Falco peregrinus</i> ...	The peregrine falcon ...	3
9.	<i>Falco peregrinator</i> ...	The shahin falcon ...	3
14.	<i>Hypotriorchis seyerus</i> ...	The Indian hobby ..	1
16.	<i>Hypotriorchis chicquera</i> ...	The red-headed merlin ...	1
17.	<i>Tinnunculus alaudarius</i> ...	The kestrel ...	2
21.	<i>Astur palumbarius</i> ...	The goshawk ...	1
22.	<i>Astur trivirgatus</i> ...	The crested goshawk ...	1
23.	<i>Micronisus badius</i> ...	The shikra ...	3
29.	<i>Aquila fulvescens</i> ...	The tawny eagle ...	1
31.	<i>Aquila pennata</i> ...	The dwarf eagle ...	2
32.	<i>Neopus malaionensis</i> ...	The black eagle ...	1
35.	<i>Limnæetus cristatellus</i> ...	The crested hawk eagle ...	1
38.	<i>Circæus gallicus</i> ...	The common serpent eagle ...	2
40.	<i>Pandion haliaetus</i> ...	The osprey ...	2
43.	<i>Haliæetus leucogaster</i> ...	The grey-backed sea eagle ...	2
48.	<i>Poliornis toosa</i> ...	The white-eyed buzzard ...	2
53.	<i>Circus melanoleucos</i> ...	The pied harrier ...	2
54.	<i>Circus æruginosus</i> ...	The marsh harrier ...	2

Jerdon's No.	Latin names.	English names.	No.
55.	<i>Haliastur indus</i> ...	The maroon-backed kite ...	2
56.	<i>Milvus govinda</i> ...	The common Pariah kite ...	2
57.	<i>Pernis cristata</i> ...	The crested honey buzzard ...	1
59.	<i>Elanus melanopterus</i> ...	The black-winged kite ...	1
60.	<i>Strix javanica</i> ...	The Indian screech owl ...	1
65.	<i>Syrnium sinense</i> ...	The mottled wood owl ...	2
69.	<i>Urrua bengalensis</i> ...	The rock horned owl ...	2
74.	<i>Ephialtes pennatus</i> ...	The Indian scops owl ...	2
76.	<i>Athene brama</i> ...	The spotted owl ...	2
78.	<i>Athene malabarica</i> ...	The Malabar owl ...	2
81.	<i>Ninox scutellatus</i> ...	The brown hawk owl ...	2

Order Insessores—Perching Birds.

86.	<i>Hirundo fluvicola</i> ...	The Indian cliff swallow ...	2
96.	<i>Acanthylis gigantea</i> ...	The Brown-necked spine tail ...	1
98.	<i>Cypselus melba</i> ...	The Alpine swift ..	1
100.	<i>Cypselus affinis</i> ...	The common Indian swift ...	2
104.	<i>Dendrochelidon coronatus</i> ...	The Indian crested swift ...	3
107.	<i>Caprimulgus indicus</i> ...	The jungle nightjar ...	1
117.	<i>Merops viridis</i> ...	The common Indian Bee-eater ...	2
118.	<i>Merops philippensis</i> ...	The blue-tailed Bee-eater ...	1
122.	<i>Nyctiornis athertoni</i> ...	The blue-necked Bee-eater ...	2
123.	<i>Coracias indica</i> ..	The Indian roller ...	2
127.	<i>Halcyon leucocephalus</i> ...	The brown-headed kingfisher ...	1
129.	<i>Halcyon fuscus</i> ..	The white-breasted kingfisher ...	2
130.	<i>Halcyon atricapillus</i> ...	The black-capped purple kingfisher ...	2
131.	<i>Halcyon coromandelianus</i> ...	The ruddy kingfisher ...	2
134.	<i>Alcedo bengalensis</i> ...	The common Indian kingfisher ...	1
136.	<i>Ceryle rudis</i> ...	The pied kingfisher ...	1
140.	<i>Homraius bicornis</i> ...	The great horn bill ...	2
141.	<i>Hydrociassa coronata</i> ...	The Malabar pied horn bill ...	1
144.	<i>Meniceros bicornis</i> ...	The common grey horn bill ...	1
147.	<i>Palæornis alexandri</i> ...	The Alexandrine parakeet ...	3
149.	<i>Palæornis rosa</i> ...	The rose-headed parakeet ...	2
151.	<i>Palæornis columboides</i> ...	The blue-winged parakeet ...	1
153.	<i>Loriculus vernalis</i> ...	The Indian lorikeet ...	1
160.	<i>Picus maharattensis</i> ...	The yellow-fronted woodpecker ...	2
164.	<i>Yungipicus Hardwickii</i> ...	The southern-pigmy woodpecker ...	1
165.	<i>Hemicircus canente</i> ...	The heart-spotted woodpecker ...	2
179.	<i>Micropternus gularis</i> ...	The Madras rufous woodpecker ...	1
180.	<i>Brachypternus aurantius</i> ...	The golden-backed woodpecker ...	1
188.	<i>Yunx torquilla</i> ...	The common wryneck ...	2
194.	<i>Megalaima viridis</i> ...	The small green barbet ...	2
197.	<i>Xantholæma indica</i> ...	The crimson-breasted barbet ...	1
199.	<i>Cuculus canorus</i> ...	The European cuckoo ...	2
203.	<i>Cuculus micropterus</i> ...	The Indian cuckoo ...	1
205.	<i>Hierococcyx varius</i> ...	The common hawk-cuckoo ...	2
208.	<i>Polyphasia nigra</i> ...	The Indian plaintive cuckoo ...	3
211.	<i>Chrysococcyx hodgsoni</i> ...	The emerald cuckoo ...	1
212.	<i>Coccyzus melanoleucos</i> ...	The pied-crested cuckoo ...	2
213.	<i>Coccyzus coromandus</i> ...	The red-winged crested cuckoo ...	2
214.	<i>Eudynamis orientalis</i> ...	The Indian koel ...	3
216.	<i>Zanclostomus viridirostris</i> ...	The small green-billed malkoha ...	1
217.	<i>Centropus rufipennis</i> ...	The common coucal ...	1
232.	<i>Leptocoma zeylonica</i> ...	The Amethyst-rumped Honey-sucker ...	1
234.	<i>Arachnechthra Asiatica</i> ...	The Purple Honey-sucker ...	2
250.	<i>Sitta castaneiventris</i> ...	The Chesnut-bellied Nuthatch ...	1
253.	<i>Dendrophila frontalis</i> ...	The Velvet-fronted Blue Nuthatch ...	2
255.	<i>Upupa nigripennis</i> ...	The Indian Hoopoe ...	2
257.	<i>Lanius erythronotus</i> ...	The Rufous-backed Shrike ...	2
260.	<i>Lanius hardwickii</i> ...	The Bay-backed Shrike ...	1
265.	<i>Tephodornis pondiceriana</i> ...	The Common Wood Shrike ...	1
267.	<i>Hemipus picatus</i> ...	The Little Pied Shrike ...	1
268.	<i>Volvocivora sykesii</i> ...	The Black headed Cuckoo Shrike ...	2

Blanford's No.	Latin names.	English names.	No.
270.	<i>Gracula maculosa</i>	The Large Cuckoo Shrike	2
272.	<i>Pericrocotus flammeus</i>	The Orange Minivet	2
276.	<i>Pericrocotus peregrinus</i>	The Small Minivet	2
278.	<i>Dicrurus macrocerus</i>	The Common Drongo Shrike	1
281.	<i>Dicrurus coerulescens</i>	The White-bellied Drongo	1
282.	<i>Chaptalia aenea</i>	The Bronzed Drongo	2
285.	<i>Edolus Malabaricus</i>	The Malabar Racket-tailed Drongo	2
286.	<i>Chibia hottentota</i>	The Hair-crested Drongo	1
287.	<i>Artamus fuscus</i>	The Ashy Swallow Shrike	2
288.	<i>Tchitrea paradisi</i>	The Paradise Flycatcher	3
297.	<i>Alseonax latirostris</i>	The Southern Brown Flycatcher	1
300.	<i>Ochromela nigrorufa</i>	The Black and Orange Flycatcher	1
342.	<i>Myiophonus Horsfieldii</i>	The Malabar Whistling Thrush	2
345.	<i>Pitta Bengalensis</i>	The Yellow-breasted Ground Thrush	2
353.	<i>Orocetes cinclorhynchus</i>	The Blue-headed Chat Thrush	1
354.	<i>Geocichla cyanotus</i>	The White-winged Ground Thrush	2
355.	<i>Geocichla citrina</i>	The Orange-headed Ground Thrush	2
356.	<i>Geocichla unicolor</i>	The Dusky Ground Thrush	1
357.	<i>Turdulus wardii</i>	Ward's Pied Blackbird	1
359.	<i>Merula nigropileus</i>	The Black-capped Blackbird	1
372.	<i>Oreocincla Nilgiriensis</i>	The Nilgherry Thrush	1
385.	<i>Pyctorhis sinensis</i>	The Yellow-eyed Babbler	1
423.	<i>Trochalopteron cacinans</i>	The Nilgherry Laughing Thrush	2
433.	<i>Malacocircus griseus</i>	The White-headed Babbler	2
434.	<i>Malacocircus Malabaricus</i>	The Jungle Babbler	2
437.	<i>Layardia subrufa</i>	The Rufous Babbler	2
450.	<i>Criniger ioticus</i>	The Yellow-browed Bulbul	1
452.	<i>Ixos luteolus</i>	The White-browed Bush Bulbul	1
460.	<i>Otocompsa Jocosus</i>	The Red-whiskered Bulbul	2
462.	<i>Pycnonotus haemorrhous</i>	The Common Madras Bulbul	2
464.	<i>Phyllornis Malabaricus</i>	The Malabar Green Bulbul	2
467.	<i>Iora zeylonica</i>	The Black-headed Green Bulbul	1
469.	<i>Irena puella</i>	The Fairy Bluebird	3
470.	<i>Oriolus kundoo</i>	The Indian Oriole	2
471.	<i>Oriolus Indicus</i>	The Black-naped Indian Oriole	1
473.	<i>Oriolus ceylonensis</i>	The Southern Black-headed Oriole	5
475.	<i>Copsychus saularis</i>	The Magpie Robin	2
476.	<i>Kittacincula macroura</i>	The Shama	1
479.	<i>Thamnobia fulvicata</i>	The Indian Black Robin	1
481.	<i>Pratincola caprata</i>	The White-winged Black Robin	1
497.	<i>Ruticilla rufiventris</i>	The Indian Redstart	1
507.	<i>Larvivora cyana</i>	The Blue Wood Chat	1
530.	<i>Orthotomus longicauda</i>	The Indian Tailor Bird	1
534.	<i>Prinia socialis</i>	The Dark Ashy Wren Warbler	1
589.	<i>Motacilla Maderaspatana</i>	The Pied Wagtail	1
591.	<i>Motacilla dukhunensis</i>	The Black-faced Wagtail	1
592.	<i>Calobates sulphurea</i>	The Grey and Yellow Wagtail	1
631.	<i>Zosterops palpebrosus</i>	The White-eyed Tit	2
645.	<i>Parus cinereus</i>	The Indian Grey-tit	1
660.	<i>Corvus culminatus</i>	The Indian Corby	1
663.	<i>Corvus splendens</i>	The Common Indian Crow	1
674.	<i>Dendrocitta rufa</i>	The Common Indian Magpie	8
678.	<i>Dendrocitta leucogastra</i>	The Long-tailed Magpie	1
681.	<i>Sturnus vulgaris</i>	The Common Starling	1
684.	<i>Acridotheres tristis</i>	The Common Myna	3
686.	<i>Acridotheres fuscus</i>	The Jungle Myna	1
687.	<i>Temenuchus pagodarum</i>	The Black-headed Myna	2
688.	<i>Temenuchus Malabaricus</i>	The Grey-headed Myna	2
690.	<i>Pastor roseus</i>	The Rose-colored Starling	1
694.	<i>Ploceus baya</i>	The Common Weaver-bird	2
695.	<i>Ploceus manyar</i>	The Straited Weaver-bird	1
697.	<i>Munia Malacca</i>	The Black-headed Munia	2
699.	<i>Munia undulata</i>	The Spotted Munia	2
703.	<i>Munia malabarica</i>	The Plain Brown Munia	2
704.	<i>Estrela amandava</i>	The Red Wax-bill	2
706.	<i>Passer indicus</i>	The Indian House Sparrow	2

Blanford's No.	Latin Names.	English Names.	No.
711.	<i>Passer flavigollis</i>	The Yellow-necked Sparrow	1
755.	<i>Mirafra affinis</i>	The Madras Bush Lark	1
765.	<i>Spizalanda deva</i>	The Small-crested Lark	1
767.	<i>Alauda gulgula</i>	The Indian Sky-lark	1

Order *gemilores* Pigeons.

773.	<i>Crocopus chlorigaster</i>	The Southern Green Pigeon	1
774.	<i>Osmotreron bicincta</i>	The Orange-breasted Green Pigeon	1
781.	<i>Carpophaga insignis</i>	The Bronze-backed Imperial Pigeon	1
786.	<i>Palumbus elphinstonei</i>	The Nilgherry Wood-pigeon	1
788.	<i>Columba intermedia</i>	The Blue Rock-pigeon	1
793.	<i>Turtur meena</i>	The Rufous Turtle-dove	2
795.	<i>Turtur suratensis</i>	The Spotted Dove	2
796.	<i>Turtur risoria</i>	The Common Ring-dove	2
798.	<i>Chalcophaps indicus</i>	The Bronze-winged Dove	1

Order *Rasores*.

800.	<i>Pterocles fasciatus</i>	The Painted Sand-grouse	3
802.	<i>Pterocles exustus</i>	The Common Sand-grouse	2
803.	<i>Pavo cristatus</i>	The Common Peacock	2
813.	<i>Gallus sonneratii</i>	The Grey Jungle-fowl	2
814.	<i>Gallus spadiceus</i>	The Red Spur-fowl	2
815.	<i>Gallus lunulosus</i>	The Painted Spur-fowl	2
822.	<i>Ortygornis ponticeriana</i>	The Grey Partridge	2
826.	<i>Perdicula cambayensis</i>	The Jungle Bush-quail	1
827.	<i>Perdicula Asiatica</i>	The Rock Bush-quail	3
828.	<i>Perdicula erythrorhyncha</i>	The Painted Bush-quail	2
829.	<i>Coturnix communis</i>	The Large Grey Quail	2
831.	<i>Excalfactoria chinensis</i>	The Blue-breasted Quail	2
832.	<i>Turnix taigoo</i>	The Black-breasted Bustard Quail	3

Order *Grallatores*.

836.	<i>Eupodotis Edwardsii</i>	The Indian Bustard	1
839.	<i>Sypheotides auritus</i>	The Lesser Florikin	2
842.	<i>Glareola orientalis</i>	The Large Swallow-plover	2
843.	<i>Glareola lactea</i>	The Small Swallow-plover	2
844.	<i>Squatarola Helvetica</i>	The Grey Plover	4
845.	<i>Charadrius longipes</i>	The Golden Plover	2
848.	<i>Aegialitis cantianus</i>	The Kentish Ring-plover	2
856.	<i>Sarcophorus bilobus</i>	The Yellow-wattled Lapwing	1
858.	<i>Esacus recurvirostris</i>	The Large Stone-plover	1
859.	<i>Oedinenus crepitans</i>	The Stone Plover	2
862.	<i>Haematopus ostralegus</i>	The Oyster-catcher	2
863.	<i>Grus antigone</i>	The Sarus Crane	1
866.	<i>Anthropoides virgo</i>	The Demoiselle Crane	1
867.	<i>Scolopax rusticola</i>	The Wood-cock	1
868.	<i>Gallinago nemoricola</i>	The Wood-snipe	1
870.	<i>Gallinago stenura</i>	The Pin-tailed Snipe	4
871.	<i>Gallinago scolopacina</i>	The Common Snipe	4
872.	<i>Gallinago gallinula</i>	The Jack Snipe	2
873.	<i>Rhynchaea Bengalensis</i>	The Painted Snipe	2
875.	<i>Limosa aegiocephala</i>	The Small Godwit	1
876.	<i>Terekia cinerea</i>	The Avoset Sandpiper	2
877.	<i>Numenius arquata</i>	The Curlew	2
878.	<i>Numenius phaeopus</i>	The Whimbrel	2
880.	<i>Philomachus pugnax</i>	The Ruff	6
884.	<i>Tringa minuta</i>	The Little Stint	2
891.	<i>Actitis glareola</i>	The Spotted Sandpiper	2
894.	<i>Totanus glottis</i>	The Green Shanks	2
895.	<i>Totanus stagnatilis</i>	The Little Green-shanks	2
896.	<i>Totanus fuscus</i>	The Spotted Red-shanks	2
897.	<i>Totanus calidris</i>	The Red-shanks	2
898.	<i>Himantopus candidus</i>	The Stilt or Long-legs	2
899.	<i>Recurvirostra avocetta</i>	The Avoset	1

Blanford's No.	Latin names.	English names.	No.
901.	<i>Hydrophasianus chirurgus</i>	The Pheasant-tailed Jacana	1
902.	<i>Porphyrio poliocephalus</i>	The Purple Coat	1
904.	<i>Gallix cristatus</i>	The Water Cock	2
905.	<i>Gallinula chloropus</i>	The Water Hen	2
907.	<i>Gallinula phoenicurus</i>	The White-breasted Water-hen	2
911.	<i>Porzana fusca</i>	The Ruddy Rail	1
917.	<i>Mycteria Australis</i>	The Black-necked Stork	1
919.	<i>Ciconia alba</i>	The White Stork	1
923.	<i>Ardea cinerea</i>	The Blue Heron	1
924.	<i>Ardea purpurea</i>	The Purple Heron	1
925.	<i>Herodias alba</i>	The Large Egret	1
927.	<i>Herodias garzetta</i>	The Little Egret	1
930.	<i>Ardeola leucopetra</i>	The Pond Heron	2
931.	<i>Butorides javanica</i>	The Little Green Heron	2
932.	<i>Ardetta flavicollis</i>	The Black Bittern	1
934.	<i>Ardetta sinensis</i>	The Yellow Bittern	2
936.	<i>Botaurus stellaris</i>	The Bittern	1
937.	<i>Nycticorax griseus</i>	The Night Heron	2
938.	<i>Tantalus leucocephalus</i>	The Pelican Ibis	1
940.	<i>Anastomus oscitans</i>	The Shell Ibis	1
941.	<i>Threskiornis melanocephalus</i>	The White Ibis	1
942.	<i>Geronticus papillosus</i>	The Warty-headed or Black Ibis	1

Order Natatores.

944.	<i>Phoenicopterus roseus</i>	The Flamingo	1
949.	<i>Anser indicus</i>	The Barred-headed Goose	2
951.	<i>Nettapus Coromandelianus</i>	The White-bodied Goose-teal	2
952.	<i>Dendrocygna awsuree</i>	The Whistling Teal	2
953.	<i>Dendrocygna major</i>	The Large Whistling Teal	1
957.	<i>Spatula clypeata</i>	The Shoveller	2
959.	<i>Anas poecilorhyncha</i>	The Spotted-billed Duck	2
960.	<i>Anas caryophyllacea</i>	The Pink-headed Duck	1
961.	<i>Chaulelasmus streperus</i>	The Gadwall	1
962.	<i>Dafila acuta</i>	The Pin-tail Duck	2
963.	<i>Mareca penelope</i>	The Wigeon	2
964.	<i>Querquedula crecca</i>	The Common Teal	2
965.	<i>Querquedula circea</i>	The Blue-winged Teal	2
967.	<i>Branta rufina</i>	The Red-crested Pochard	2
971.	<i>Fuligula cristata</i>	The Tufted Duck	2
975.	<i>Podiceps philippensis</i>	The Little Grebe	3
979.	<i>Kroicocephalus ichthyaetus</i>	The Great Black-headed Gull	1
980.	<i>Xema brunnicapala</i>	The Brown-headed Gull	1
989.	<i>Thalasseus cristatus</i>	The Large Sea-tern	2
990.	<i>Thalasseus Bengalensis</i>	The Smaller Sea-tern	2
995.	<i>Rhynchops albicollis</i>	The Indian Skimmer	1
1004.	<i>Pelecanus philippensis</i>	The Grey Pelican	2
1005.	<i>Graculus carbo</i>	The Large Cormorant	2
1007.	<i>Graculus javanicus</i>	The Little Cormorant	2
1008.	<i>Plotus melanogaster</i>	The Indian Snake Bird	1

CLASSIFIED LIST OF EXPENDITURE OF THE GOVERNMENT CENTRAL MUSEUM DURING THE YEAR 1892-93.

	Salaries.	Actuals, 1892-93.	Revised estimate, 1892-93.
		RS.	RS.
Superintendent	...	10,150	9,600
<i>Permanent Establishment.</i>			
First Assistant, Second Assistant, First, Second and Third Taxidermists, Herbarium Keeper, Artist, Writer, Librarian, Assistant Librarian, Head Humal, Superintendent's peon—12 persons	...	4,884	4,884
<i>Temporary Establishment.</i>			
Assistant writer, 12 humals, chickledar, 3 gardeners, collecting taxidermist, 2 sweepers, 4 watchmen, water-pandal Brahmin, office peon, 2 punkah pullers—28 persons	...	2,565	...
Total, establishment	...	7,449	4,884
<i>Allowance.</i>			
Travelling allowance	...	1,178	1,000
<i>Supplies and Services.</i>			
Cost of specimens purchased on tour	...	1,378	1,000
Cost of specimens, objects of interest and coins at head-quarters	...	99	200
Preparation of fittings, furniture, &c., for the collection	...	2,999	3,000
Total, Supplies and Services	...	4,476	4,200
Cost of books and publications	...	2,172	1,800
<i>Contingencies.</i>			
Purchase and repair of furniture	...	195	200
Binding books and lithographing plates	...	380	800
Rents, rates and taxes	...	1,098	1,098
Postal charges, telegram charges, office expenses and miscellaneous	...	1,571	4,024
Kerosine-oil grant	...	15	19
Total, Contingencies	...	3,259	6,141
Grand Total	...	28,684	27,625

READ—the following letter from Dr. H. WARTH, Officiating Superintendent, Government Central Museum, Madras, to the Secretary to Government, Revenue Department, dated 11th May 1893, No. 566 :—

In obedience to paragraph 3 of G.O., Revenue Department, No. 224, dated 7th March 1893, I have the honour to send herewith two printed copies of my report on the working of the Government Central Museum for 1892-93.

2. I have also the honour to inquire whether I am to forward the 35 copies plus 2 advance copies of the report without the Government review thereon to the Assistant Secretary to Government, Revenue Department, as per G.O., Revenue Department, No. 290, Mis., dated 25th January 1893, for transmission to the India Office, &c., as desired in paragraph 2 of G.O., Financial Department, No. 316, dated 24th March 1893, communicated to me in G.O., Revenue Department, No. 1409, dated 19th April 1893.

ORDER—dated 6th June 1893, No. 478, Revenue.

Miscellaneous.

With his letter read above, Dr. Warth submits his report on the administration of the Government Central Museum during 1892-93. The report contains much matter of scientific interest and shows satisfactory progress in all departments of the Museum.

2. As compared with the previous year the total number of visitors to the Museum showed a decrease of 20,214 which is not satisfactorily accounted for. The number of persons who visit a public institution like a Museum depends, however, on a variety of causes and naturally fluctuates from year to year. The number of gosha ladies who visited the Museum rose from 1,409 in 1891-92 to 1,957 in 1892-93. The number of visitors to the library was also slightly in excess of the previous year's figure. The library received numerous additions in the shape of books and publications, and a library catalogue, which has recently been compiled and is now being printed, will supply a long-felt want.

3. Dr. Warth made some interesting geological excursions during the year, the results of which are embodied in his "Notes on Minerals" which form one of the appendices to his administration report. It was mentioned in the previous year's review that a sample of the phosphatic nodules discovered by Dr. Warth in the Trichinopoly district had been sent to England for analysis by an agricultural chemist. The analysis, the result of which has recently been communicated to this Government by the Secretary of State for India, has proved fairly satisfactory, but it is not yet known whether the deposits of phosphate of lime are sufficiently deep to make it profitable to convert the nodules into superphosphate for purposes of exportation or for use locally, and Dr. Warth has been instructed to make further inquiries on the subject in consultation with the Director of Agriculture and to submit a full report to Government.

4. The actual expenditure of the Museum department during the year under review amounted to Rs. 28,684, or Rs. 1,084 in excess of the revised estimate. The reasons for the variations from the revised estimate, which occur chiefly under the heads "Superintendent's salary," "Cost of specimens purchased on tour," and "Cost of books and publication" should have been briefly explained in the classified list of expenditure appended to the report.

5. In conclusion, His Excellency the Governor in Council desires to express his thanks to the members of the public who made contributions to the various departments of the Museum.

6. Separate orders have been issued on the question raised in paragraph 2 of the Superintendent's letter read at the head of this Proceedings.

(True Extract.)

Secretary to Government.

To the Superintendent, Government Central Museum.

„ the Public Department,
„ the Commissioners of Land Revenue.
„ the Commissioner of Revenue Settlement, Land Records and Agriculture.
„ the Accountant-General.
„ the Surgeon-General with the Government of Madras
(through the Public Department).

No. 478A.

Copy to the Government of India, Revenue and Agricultural Department.

(Signed) C. A. GALTON,
Secretary to Government.

Exd. C. M. Brisson.

200 Copies.

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G.O., 6th June 1893,
Nos. 478, 478A.

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Government Central Museum.

Reviewing the administration report of the —
for 1892-93.

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ENCLOSURES.

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