

# THE EARLIEST "TREATISE" ON MALTESE FOSSILS

GEORGE ZAMMIT-MAEMPEL

On October 6th, 1794, a Bavarian Knight of the Order of St. John of Jerusalem — referred to merely as "Sig<sup>r</sup> Abbate Bettz, Gerosolimitano Bavar" — delivered a lecture on Maltese fossils at the "Accademia Letteraria di Malta". (1) The unsigned manuscript of that lecture reached the National Library in Valletta, Malta, on September 6th, 1889 as a donation by Mr Emmanuel Mangion. It is now registered in that institution as *Manuscript No. 349*, but nothing further is known about its history. The accession is recorded in a short note written by a Library official on the front page of the manuscript and also in the *Malta Government Gazette*. (2)

Much of what Bettz said in that lecture is now of historical, rather than scientific interest, but the manuscript recording his oration is one of the earliest milestones in the history of Maltese Palaeontology. It could, in fact, be regarded as the earliest "Treatise" on the fossils of the Maltese Islands that has come to light so far. It is not that Bettz was the first naturalist to write about Maltese fossils, but that he was the first to treat them systematically, in detail and to some extent, scientifically.

Earlier work on Maltese fossils were either monographs on 'Glossopetra' (a name given to fossil sharks' teeth based on their resemblance to a tongue) by such authors as Buonamico (1668), (3) and Seychell (1753), (4) or general works that alluded to Maltese fossils merely as a sideline. Amongst these

1. BETTZ, Abbate *Discorso Accademico delle Petrificazioni di Malta del Sig<sup>r</sup> Abbate Bettz, Gerosolimitano Bavar*, Letto dal Medesimo nell'Accademia Letteraria di Malta il di 6 Ottobre 1794.  
[N]ational [L]ibrary [M]alta Ms. No. 349, 34pp.
2. THE MALTA GOVERNMENT GAZETTE No. 3360, Monday, 11 November 1889 p. 773, Government Notice No. 195.
3. BUONAMICO, G.F. *Trattato circa l'origine delle Glossopetra, Conchiglie ed altre pietre figurate, che si cavano nelle rocche dell'Isola di Malta* — Composta dal Dr. Gian Francesco Buonamico, Maltese, Medico e filosofo, istorico e poeta. Dirizzata al Sig. Agostino Scilla, Messinese, accademico della Fucina, detto lo Scolorito. N.L.M. Ms. No. 3 (an unsigned manuscript dated 1668).  
This Ms. was subsequently published in 1770 in *Opuscoli di Autori Siciliani*, Tom. XI, Palermo, pp.125-200, as "Lettera Missiva del Sig. Francesco Buonamico, Maltese, dottore di Medicina, filosofo, poeta, diretta ad Agostino Scilla ecc. Data sotto il d<sup>o</sup> 28 d'Agosto, 1668".
4. SEYCHELL. Dun G. *Risposta circa l'origine delle Glossopetra*. 1753  
N.L.M. Ms. No. 1277.

publications one can cite Sloane's Ms 763, (5) Abela (1647), (6) Scilla (1670), (7) Leibniz (1693), (8) and Georgio (1730). (9) In all cases, the subject was not treated "systematically and scientifically". Buonamico, for example, was concerned chiefly with the origin of 'Glossopetra' and of other 'figured stones'. Such fossils were to him 'products' of nature made in the resemblance of animals or their parts merely because 'it pleased God to have such forms around'. (10) Dolomieu's 'Catalogue de Principaux fossiles de Malta', published as an appendix to Guignard de St. Priest's travelogue on Malta (1791) (11) seems to be the only publication of any scientific value to have preceded Bettz's manuscript (1794). As its title implies, however, Dolomieu's work is merely a list of fossils found by the author during his sojourn on the Island and does not deal with Ma'lese fossils formally, in detail or scientifically.

Manuscript No. 349 is in the Italian language, written in a small hand on both sides of the flimsy sheets of a paginated (1 to 43) copybook (165mm x 230mm). The frequent use of abbreviations and symbols that are now no longer in use greatly interfered with the easy reading of the manuscript, but what proved to be the greatest problem was the smudged text. The flimsiness of the paper allowed the eighteenth century jet-black ink to penetrate into its thickness rendering the text on either side of the page often virtually illegible.

For a detailed study of the text at ease, the manuscript was micro-filmed and attempts were then made to decipher the writing with the aid of a large microfilm reader. The device, however, failed to be of much use as it merely provided a magnified flat image of the smudged text. Recourse was then had — and with excellent results — to a x25 stereo microscope. This

5. SLOANE MANUSCRIPT No. 763. *Se la Virtù alessifarmaca della Terra, Glossopetre, Conchiti, Achini ed altre pietre figurate che si cavano dalle Rocche di Malta, sia innata o Miraculosa*, British Library, London, Sloane Collection, Ms. 763, pp. 1-7.
6. ABELA, G.F. *Della Descrittione di Malta, isola del Mare Siciliano, con le sue antichità, ed altre notitie, Libri Quattro*. Malta, Paolo Bonacota, 1647.
7. SCILLA, A. *La vana speculazione disingannata dal senso*. Napoli, Andrea Colichia. 8vo., 168 pp., 28pls. 1670.
8. LEIBNIZ, G.W. *Protogea* In: "Acta eruditorum Lipsiae" Joh. Gross. Erben u. Joh. Thom. Fritsch, Leipzig, 1693.  
*Protogea. Ex schedis manuscriptis edita a Christiano Ludovico Scheidio. Göttingen, 1749, Pl. 1-XII, pp. 1-86.*
9. GEORGIO, I. D. *Paulus Apostolus in Mari, quod nunc Venetis sinus Dicitur; naufragus et Melitae Dalmatensis Insulae post naufragium hospes sive De genuina decorum locorum in Aetibus Apostolicis... Inspectiones anticriticae*  
Venetiis Apud Christophorus Zane Superiorum permissu, Ac Privilegio MDCCXXX, 313pp.
10. BUONAMICO, GF Ms. 1668 p.576.
11. GUIGNARD, F.E. de, COUNT de SAINT PRIEST. *Malte, par un voyageur françois*. Malta 1791, 1 vol. (2 parts), 8vo., 116pp., 7 pls. see part II pp. 106-112.

separated the superimposed writing on opposite sides of the page by 'differential focussing'.

It is probable on account of the great difficulties encountered in reading the text that no reference has ever been made to this important document. Its historical value was 'discovered' by the present author (1974) when sifting through the Archives of the Order of St. John of Jerusalem and other manuscripts now at the National Library in Valletta, for information relating to the early history of Maltese Geology and Palaeontology.

The contents of Manuscript No. 349, entitled *Discorso Accademico/Delle Petrificazioni/di Malta/del Sigr Abbate Bettz/Gerosolmitano Bavaro/letto dal Medesimo nell'Accademia Letteraria di Malta il dì 6 Ottobre 1794*, may be conveniently divided into three main sections:

(i). An Introduction (pp. 1-2) wherein the author outlines the subject (The fossils of Malta and Gozo), reveals what prompted him to tackle such an important undertaking and stresses the intimate relationship existing between fossils and the history of the Earth;

(ii). A section giving information on 'Le petrificazioni' (fossils) in general (pp. 2-14), and Maltese fossils in particular (pp. 14-16), and, lastly;

(iii). An important part containing a systematic classification of Maltese fossils with a record of the modern seas wherein the living analogue of each local fossil is to be found (pp. 17-34).

It is to be noted that Bettz distinguished between 'Petrificazioni', 'Fossili' and 'Noccioli' (di petrificazione), which by modern usage are all considered to be fossils. He calls 'petrificazioni' those buried organic remains that are completely (including their shell) turned into stone, 'fossili' those that are themselves petrified but have their shell unaltered, and 'nuclei' those 'petrificazioni' whose shell has completely disappeared (internal moulds).

In the Manuscript, the author often underlines whole sentences that are of particular importance to the general understanding of the subject. Whenever possible, or deemed necessary to demonstrate the lecturer's grasp of the subject, these key sentences are reproduced (in different type) also in this study.

The lecturer ended up his discourse with a moral, stressing the fact that only serious study will ultimately solve hidden geological and palaeontological problems. Just as inscriptions record the achievements of Man, so do fossils record those of Nature: "*Le iscrizioni additano le imprese degli uomini, gli impetrimenti quelli della natura, ma ambedue ricercano studio per essere decifrate*" (p. 34). The quotation is from Petrini's book (1792), (12) describing the mineralogical collection which His Majesty Joseph II, Emperor of Austria,

12. PETRINI, G.V. *Gabinetto Mineralogico del Collegio Nazzareno descritto secondo i caratteri esterni e distribuite a norma di Principi costitutivi.*  
Roma. 2 vols. 1791-92, Vol. II, p. 235, 1792.

had bequeathed (1785) to the Museum of Mineralogy at the Collegio Nazzareno in Rome. This institution enjoyed great esteem and renown during the eighteenth century and was the place where the Maltese historian Count Giovannantonio Ciantar completed his studies. (13) Popes and royalties visited the Collegio Nazzareno and it was in appreciation of his visit to the place on March 24th 1769 that Emperor Joseph II of Austria despatched from Vienna several boxes containing mineralogical specimens collected at his orders from Hungary. These were meant to enrich the Museum of Mineralogy which Padre G.V. Petrini had founded at the Collegio Nazzareno. (14)

Maltese Tertiary fossils, particularly echinoids, have long been famous for their beauty and good preservation and Bettz records that it was the abundance of these fossils and their great variety and beauty, coupled with the profound interest shown in them by local people and several cultured visitors, that prompted him to tackle the subject of Maltese fossils (p.1). The lecturer did not fail to acknowledge his shortcomings, for he modestly declared to his distinguished audience that his knowledge of the subject was 'greatly limited' and that his stay on the Island, or rather, the time he was able to devote to the study of the Natural History of the Island, had been relatively short. This was due to his heavy commitments: "*Il soggiorno mio in quest'isola in riguardo alla Storia Naturale ancora un pò breve e da tante altre cose interrotto*" (p. 1).

Bettz introduces his audience to the meaning of fossils and to the requirements of fossilization: "Le Petrificazioni", he explains, "sono corpi animali o vegetali o parti di essi che sono diventati terra o pietra e trovansi sepolti sotto terra" (p.2). He also stresses that they are not, as some would have them, 'scherzi della natura', for they are too closely similar to organic remains to be considered accidents of nature (p. 14).

The importance of burial for fossilization is duly stressed, stating that burial protects organic remains from the corrosive action of atmospheric gases and of running water. Consequently, he records, "Le Petrificazioni... non trovansi in altri luoghi che nascosti più o meno profondamente nelle viscere della terra, non mai però nella sua superficie" (pp. 6-7). He clearly points out, however, that this does not mean that fossils cannot now be found exposed

13. CIANTAR, G.A. *Malta Illustrata, ovvero descrizione di Malta isola del mare Siciliano e Adriatico..... corretta, accresciuta e continuata dal Conte Giov. Ant. Ciantar, Malta, Palazzo di S.A.S. per F.G. Mallia, 2 vols. (1772, 1780). II, Lib. IV, 1780, p.600.*  
(See also MANGION, G. "Giovanni Antonio Ciantar — Letterato Maltese del Settecento." *Malta Historica* 7(2): 157-162, Malta, 1977. p.157).

14. GIORNALE DEL COLLEGIO NAZZARENO 1766-1797, entry 14 Giugno, 1785.  
(See also VANUCCI, P. "Il Collegio Nazzareno MDCXX-MCMXXX. Roma, 1930. pp. 142-143; 162-163).

at surface, for the elements could have eroded the overlying rocks. By way of example of such exposures he mentions the large number of fossil sea urchins that could once be seen at surface at "Dragut Point" (Tigné Point) before the building of "the new bridge" (?) (p. 7).

This fossil site seems to have been well known in ancient times for it is mentioned also in Buonamico's manuscript. (15) Both authors are undoubtedly alluding to what may be called "the *Schizaster* bed", in the Lower Globigerina Limestone division exposed at this site. Similar beds at corresponding levels in the same formation have been encountered also around Fort St. Elmo, Marsamxett, Bahar iċ-Ċagħaq and Qammieħ. They all abound in *Schizaster parkinsoni* (Defrance), *Eupatagus dekonincki* (Wright) and *Brissopsis crescenticus* (Wright) with an occasional *Lovenia duncani* (Gregory). Unlike Bettz, however, Buonamico (1668) did not consider these "petrificazioni" as fossil echinoids (sea urchins), but merely as "figured stones": "pietre in forma d'echini che i naturalisti chiamano Spatagli", — objects formed in that shape solely because it pleased God to have such particular figured stones and shapes around". (16)

Like most of his contemporaries, Bettz believed in a "sugo petrificante" or lapidifying juice, being present in rocks and soils (p. 5) and argued that as most Maltese fossils were calcareous, the lapidifying juice in local rocks must also be calcareous (p. 15). The juice was said to seep through the tiny pores of all buried objects and to turn these very gradually into "petrificazioni". The process was considered to be very slow indeed and as Bettz asserts: "Non si richiede poco tempo finchè un corpo animale o vegetale si petrifichi" (p. 4). Fossils must consequently be of very great antiquity. "Le petrificazioni portano seco una remotissima antichità" (p. 6) and those found at great depths reveal, not only their very great antiquity, but also the great changes which the Earth has undergone through geological time (p. 8). Fossils are, as he puts it, "testimoni evidentissimi ed irrefragabili" delle rivoluzioni succedute nel nostro globo" (pp. 9-10). Further evidence of the great changes which the Earth has undergone throughout its life history is provided also by the remains of marine organisms embedded in rocks outcropping far inland (p.11-12), by the Universal Deluge mentioned in the Bible (p. 12), by the occurrence of marine transgressions and regressions known to have occurred during our lifetime (p. 13), and by the presence of analogues or living representatives of fossils surviving in modern seas occurring at very great distances from the locality of their fossil ancestors (p. 11).

Basing himself on the maxim "La natura in tutte e tre i regni non ci diede ancora un esempio che una delle sue produzioni si fosse perduta" (p. 11),

15. BUONAMICO, G.F. op. cit. Ms. 3. p. 520.

16. BUONAMICO, G.F. op. cit. Ms. 1668, p.576.

the Bavarian priest expressed his belief that every fossil must necessarily have its representative or analogue surviving somewhere in modern seas, possibly even thousands of kilometres away from the location of its fossil ancestors. He also records that whenever no such living analogue is known, it does not mean that it does not exist, but only that it has not yet been found. It could be lurking somewhere at very great depths "incogniti e nascosti all'occhio nostro negli abissi più profondi ed impenetrabili del mare" (p. 11).

The accidental recovery, in 1938, of the supposedly long-ago extinct Coelocanth fish *Latimeria chalumnae* from a depth of 73 metres about five kilometres off Chalumna river-mouth south-west of East London (South Africa) and of further specimens of this living fossil in 1952 from off the Camoris group of islands north of Madagascar seems to confirm and give credit to Bettz's eighteenth century belief. Over 70 more specimens of the Coelocanth fish have since been caught though it was formerly believed that the fossil Coelocanth had no living analogue.

Bettz (1794) was the first to record the Indo-Pacific affinity of some Maltese Tertiary fossils, for he noted that the living analogues of most Maltese Tertiary specimens were not to be found in the adjoining Mediterranean, but chiefly in the Indian and Atlantic Oceans (p. 11). The discovery of Ms. 349 has consequently pushed backwards the earliest recorded reference to such an affinity by almost a century. (17)

After giving the necessary basic explanations on fossils and fossilization, Bettz outlines what is probably the earliest classification of Maltese fossils (pp. 17-34). This is based on that adopted by Johann Gottschald Wallerio (1775) in his *Systema Mineralogicum*. (18)

In view of its historical importance, the classification adopted by Bettz is being reproduced hereunder as in the original, but with (whenever possible), the addition of the equivalent modern nomenclature and short explanatory notes in square brackets. In the case of Echinoids and sharks' teeth, specific identification (based on information supplied in text) has also been attempted.

I. *Corallina Corpora* (p. 17)

[This group includes Corals and Bryozoa]

*Madrepora cellularis*

*Millepora globosa*

17. ZAMMIT-MAEMPEL, G. The Indo-Pacific affinity of some Maltese Tertiary fossils. *The Central Mediterranean Naturalist* 1 (1): 1-12, Malta January 1979.

18. WALLERIO, J.G. *D.D. Systema Mineralogicum quo corpora Mineralia in Classes, Ordines, Genera et Species suis cum varietatibus*. Divisa, Describuntur atque Observationibus, Experimentis et Figuris aeneis illustrantur a Johan. Gottsch. Wallerio. Holmiae. Impensis e Det. Direct. Laurentii Salvii. 1775. Tom II, in qua Mineræ & Concreta describuntur cum Indice quadruplici, pp. 399-564.

## Corallo/Fungita orbicularis fungiformes

II. *Zoophytoiythi* (p. 18)

[Group includes remains of "marine animals that resemble vegetation"]

Asterie [=Crinoids]

Ficoidi o Pero marino [=Bryozoa or Sponges]

III. *Conchiglia Petrificata Univalvia* (pp. 19-20)

[Classification is said to be based on "Valerio" (=Wallerio 1775). Subdivisions listed hereunder all refer to Gastropods, but 2b refers to Teredinid bivalves]

1. Patellite [=Limpets]

2. Canalitae [=Worm tubes]

a) Canalitae striati [=*Dentalium*]b) Canaliti geniculati, vel plus minus reflexi (Valerius)  
[=Kuphus tubes]

3. Turbinite [=Turbinate/spirally coiled shells]

4. Volutatae [=Volute shells]

5. Porcellanitae [=Cowries]

IV. *Conchiglia Petrificata Bivalvia* (pp. 21-26)

[Division incorporates Bivalve molluscs, including Brachiopods]

1. Ostraciti

a) Ostracita squamosa aut lamellosa elongatior

b) Ostracita Echinantus [=*Spondylus*]

2. Terebratulite [=Brachiopods]

e.g. "Terebratula magnus"

3. Chamitae

a) Nuclei chamorum ventricosarum ambito rubro tinto

b) Nuclei chamorum ambiti ovali

c) Nuclei chamorum generis Nymphaeum striis minimis

d) Nucleo Chama = "Chama di Lingua d'Oca"

e) Nucleus chama elongata

4. Muscalita vel Mytulita

5. Tellenite

e.g. Diana striis violaceis

Diana alba

Tellina pelosa

6. Buccardite

e.g. Buccardite striato

a) Nuclei Buccardiorum rostro dupli recurvato

[=Glycimeris]

- b) Nuclei Buccardiorum striorum
- c) Nuclei Buccardi, dicti 'Arca Noe'
- d) Nuclei Buccardorum striorum ques dicuntur

'Arca Noe alba'.

#### 7. Pectinita

- a) Pectinites striis dictus Conchylium Sti Jacobi vel Peregrinorum.
- b) Pectinites scorza d'Arancio o di Limone
- c) Pectinites dictus paludamentum ducale o Manto ducale
- d) Pectinites dictus a Gallis La Sole [=?Amussium]

#### V. Conchiglia Petrificata Multivalvia: Echinitae (pp. 27-31).

Echinoids or Sea urchins.

- a) Echinites miliaris [=Echinus sp., ?Arbacia]
- b) Echinites miliaris esculentus [=Schizechinus sp.]
- c) Echinites mamillaris [=Cidaris' sp., Stylocidaris melitensis Wright 1855]
- d) Echinites Spatago magnus [=Schizaster parkinsoni (Defr.) /eurynotus Ag.]
- e) Echinites cuneiformis conicus [=?Clypeaster sp.]
- f) Echinites conicus [=Clypeaster altus Klein var. ?alticostatus Mich./pyramidalis Mich.]
- g) Echinites stellaris paululum conicus [=Echinolampas hemisphericus (Lamarck) 1816]
- h) Echinites scutatus [=Clypeaster marginatus Lmk. 1816]
- i) Echinites clipeiformis stellaris cum quinque radii [=?Echinolampas lucae (Dieot.)]
- j) Echinites clipeiformis cum stella quatuor radiorum [=Eupatagus dekonincki (Wright) 1855]
- k) Echinites stellaris cum quinque radii sulcatus [=Ditremaster scillae (Wright) 1855]
- l) Echinites placentiformis [=Scutella subrotunda (Leske)]
- m) Echinites brissus [=Brissus oblongus Wright 1855]

#### VI. Entromolithi o Insetti petrificati [=Crustacea] (p. 31)

#### VII. Ichthyolithi (pp. 32-33)

=Pisces, Bony fishes and Sharks

- a) Ichthyolithi ossium piscium [=whole or part of skeleton, including isolated vertebrae which are herein referred to as "Xylostea vertebrarum piscium"]
- b) Ichthyolithi dentium acutorum piscium vel

## Odontopetrae

[=Fossil sharks' teeth, herein referred to also as "Glossopetrae" and "Lingue di S. Paolo"]

Bettz records here that "all six types of Odontopetrae listed by "Valerius" (=Wallerio, 1775) are recorded from Malta":

- i. Odontopetrae triangulare majores margine serrato  
[=Carcharodon megalodon Ag.]
- ii. Odontopetrae triangularis marginibus rectis integris  
[=Isurus sp.]
- iii. Odontopetrae conicae cuspidatae, linguae aut rostrae avium similis  
[=Odontaspis sp.]
- iv. Odontopetrae pyramidalis, mucrone reflexo  
[=Galeocerdo aduncus Ag.]
- v. Odontopetrae conicae recurve forma falcis  
[=Hemipristis serra?]
- vi. Odontopetrae conicae, rectae, minores, forma dentium acutorum  
[=?Squatina/Sphyrena] (= "Luciodontes")

c) Ichthyolithi dentium molarum piscium vel bufonites  
[=Palatal teeth/molars of *Sargus* family]  
("Occhi di serpe", "Crapaudines")

Who was the "Abbate Bettz, Gerosolmitano Bavaro" who on October 6th, 1794 delivered such an interesting lecture on Maltese fossils? What was his cultural background and his local rôle in the Order? When did he come to Malta and how long did he remain here? Did he carry out any further studies on Maltese fossils? What happened to his collection?

These are the questions that immediately come to mind after reading the manuscript of his lecture, but no documented information could be obtained on "Abbate Bettz" in the Archives of the Order in Malta or in Bavaria. His name does not even figure in such important records of the Order as the *Ruolo Generale dell'Ordine 1771-1798* (19) or in *Cariche in Convento e fuori Convento 1780-97*. (20)

Absence of his name from the above registers suggests that, either the Knights were not very particular about the completeness of their records during

19. *Ruolo Generale dell'Ordine* (1771-978). N.L.M., [A]rchives of the [O]rder of [M]alta. This is a register recording the names of all Knights of the Order stationed in Malta throughout the stated period.
23. ZAMMIT-MAEMPEL, G. *op. cit.*, p. 3.
20. *Cariche in Convento e fuori Convento in cui sono indicati i nomi di coloro che hanno occupato impieghi nell'Ordine Gerosolimitano a Malta e nell'estero 1780-1797* N.L.M., A.O.M. 6430-31.

the final years of their stay on the Island (1530—1798), or that "Abbate Bettz" was not a Knight at all, but merely a "Priest" of the Order. As such he would not have qualified for listing in any of the above-mentioned registers. There is no evidence that "Bettz" ever published anything, either locally or abroad, as his name does not figure in Hellwald's Bibliography of the Order (1885) (21) or in Rossi's supplement (1924), (22) which together list all publications irrespective of their authors, rank or status. It was not possible to find any information on "Abbate Bettz" or on his lecture in any journal of the period as the earliest local paper *Le Journal de Malte* appeared almost four years later (1798). Another possibility to explain this apparent incomplete documentation is that "Abbate Bettz" was not the real name of the lecturer.

In spite of his professed limitations, or as he puts it, "essendo il mio sapere molto limitato ed il soggiorno mio in quest'Isola in riguardo alla Storia Naturale ancora un pò breve e da tanti altri affari interrotto" (p. 1), Bettz gives a very good account of local fossils and fossilization, including some original observations.

He based his lecture on personal experience in the field in Malta and Gozo, as well as on a detailed study of his personal collection of Maltese fossils. "Cercherò di comunicarvi fedelmente quel che potevo effettuare con una sollecita raccolta di tali produzioni" (p.2) is what he tells his audience. Most of his statements are supported by "principi sani ed evidenti durante la mia dimora in Malta" (p. 2) — sound basic principles of geology and paleontology acquired from scientific books and "knowledgeable friends", but proved by him in the field during his stay on the Island. The lecturer does not tell who were the "amici litterati" with whom he seems to have often discussed the subject of Maltese fossils. It is evident however, that Bettz consulted authoritative books of the period, and relied considerably for his lecture on Wallerio (1775) and Petrini (1792). In fact, most of the second part of his lecture is based on Petrini, and whilst the third section — particularly the classification of the "Conchiglia Petrificata Univalia" (p. 19) (=the echinoids) and of the "Odontopetrae" (p. 33) (=fossil sharks' teeth), is partly based on Wallerio, to whom he persistently refers as "Valerius" or "Valerio".

Bettz must, most definitely, have had a good knowledge of Biology and Natural History, for not only does he quote technical terms, but also reveals that he appreciates the importance of biology in the study of fossils. He does in fact, compare local fossils with living specimens and notes the affinity

21. HELLWALD, F.H. *Bibliographie methodique de l'Ordre Souverain de St. Jean de Jerusalem.*  
Rome, Impr. Polyglotte de Propagande, 1885. 321pp., Index.
22. ROSSI, E. *Aggiunta alla Bibliographie methodique de l'Ordre Souverain de St. Jean de Hellwald.*  
Roma, Tipografia Poliglotta Vaticana, 97pp. 1924

some Maltese Tertiary fossils have with present-day Indo-Pacific fauna. This he does by asserting that the living analogues of many fossils recovered from Maltese rocks are to be found in the Indian Ocean and sometimes also in the Atlantic. This is probably the earliest reference to Indo-Pacific of Maltese Tertiary fossils and as already stated above pushes backward the previous known record by almost a century. (23)

Bettz was also well aware of the part played by weathering and erosion in the exposure of deeply buried fossils (pp. 6-7), and realises that it was the process of differential weathering that made them stand out unaltered when their matrix had disintegrated under the influence of the elements. "La rocca in cui si trovano i [detti] Echiniti" he records, "è più molle dei medesimi ed in conseguenza è più disposta a distruggersi ed a dissiparsi lasciando in dietro i corpi più resistenti" (p. 7).

Referring to the relative ages of local rocks and the fossils embedded in them, he rightly observed that "la massa che cuopre e chiude in se il corpo strano, deve essere più recente di esso e questo più antico di quella" (p.9) — the rocks enclosing and overlying a fossil are younger than the fossil itself. Although this does not directly explain what in later years came to be known as the "Principle of Superposition" (that younger rocks lie on top of older ones), it seems a good hint to it.

By recording some local lore associated with fossils and geological features, Bettz reveals that he had been in contact with the local country people. From them he must have learned that Il-Merżuq, an acutely conical hill on the outskirts of Marsalforn, Gozo, was by some held to be an extinct volcano (p. 30) and that fossil sharks' teeth, (or as he calls them "Odontopetrae"), were for some reason unknown to him, referred to as being "Tongues of St. Paul" (p. 32). The shape of il-Merżuq is actually the result of an advanced stage of weathering and erosion of a clay hill that was once capped by a deposit of Upper Coralline Limestone.

Throughout his stay on the Island, Bettz must have roamed the countryside far and wide in search of fossils, for he was able to record the presence of such fossiliferous sites as Dragut Point = Tignè Point (p. 7), Dingli, (p. 23), Fort Ricasoli (p. 25), and Maqluba (p. 31). He also spotted the *Scutella* bed in Gozo (probably at Dwejra) and recorded that the sea urchin "*Echinites placentiformes*" [= *Scutella subrotunda* (Leske)] *trovansi in gran numero nell' Isola del Gozo*" (p. 30).

In spite of his many fossil excursions, however, it is surprising that Bettz

23. ZAMMIT-MAEMPEL, G. *op. cit.*, p.3

LYDEKKER, R. On the Occurrence of the Crocodilian Genus *Tomistoma* in the Miocene of the Maltese Islands.

*Quart. J. Geol. Soc., London*, 42:20-22, pl. 2 fig. 1-2. p.22.

never made any mention of the different geological formations outcropping on the Maltese Islands, thereby indicating that he never really had any idea of local stratigraphy. Only once does he give any details of the rocks encountered locally: when describing the Upper Coralline Limestone rocks capping il-Merżuq in Gozo, he records these to have been "friable, highly fossiliferous and composed of fragmented shells" (p. 30).

Bettz made several important original observations on the mode of preservation of local fossils. He recorded, for example, that some molluscs, like Oysters (p. 21) and *Terebratula* (p. 22), are always preserved with their shells unaltered, whilst others, like *Tellina* (p. 24), *Arca noe* (p. 22), *Voluta* and "Porcellane" [=Cowries] (p. 20), occurred locally solely as "Noccioli" or internal moulds (see also p. 16). He observed also that "Canaliti geniculati, vel plus minus reflexi" of "Valerio" (24) occur locally always as "infilled tubes" and are "abundantly present at Maqluba (p. 19). These fossils are probably *Kuphus* tubes. Their abundance at Maqluba was confirmed by Leith Adams (1870, p. 27) (25) after almost a century and the nature of their preservation was confirmed by the present writer in recent publications. (26)

Having encountered numerous fossils in the field, Bettz was in a position to comment also on the rarity or otherwise of some specimens. Thus, for instance, he was astonished at the large quantity and the many varieties of shark's teeth encountered on the Maltese Islands, declaring that: "È mirabile la quantità grande delle Odontopetrae di varia grandezza e forma che si trovano qui specialmente nel Gozo" (p. 15).

What impressed him most however, was the beauty of Malta's fossil echinoids or sea urchins, to which he gave pride of place amongst all local fossils. "Gli Echinini", he records, "meritano la preferenza, essendo cene specie belle e varie" (p. 15).

Bettz listed and described (superficially) thirteen species of fossil sea urchins encountered in Maltese rocks. His nomenclature, however, does not conform with the accepted Latin binomial terminology adopted by Linneus in 1758. (27) He uses instead, a descriptive form of nomenclature wherein each name consists of two to six Latin words. The description of his species is often so vague that it could easily fit two or three other species and some-

24. WALLERIO, J.G. (1775). *op. cit.* p.470, (b), lists "Viperae Melitenses petrificatae" as a synonym of these fossils.
25. ADAMS, A.L. *Notes of a Naturalist in the Nile Valley and Malta*. Edmonston & Douglas, Edinburgh, 1870, 295pp. p.27.
26. ZAMMIT-MAEMPEL, G. *An Outline of Maltese Geology*, Malta, 1977. p.23; pl. 15.
27. ZAMMIT-MAEMPEL, G. *Kuphus melitensis* n.sp. (Bivalvia, Teredinidae) from the Lower Coralline Limestone (Upper Oligocene) of Malta. (in press).
28. LINNEUS, C. *Systema naturae* Editio Decima, Reformata Holmiae, Impensis Direct. Laurentii Salvii 1758.

times even genera.

Bettz's description of the Bivalvia, however, is usually much more detailed and specific, thereby suggesting that he was probably more interested in Molluscs than in Echinoids.

A detailed study of the specimens in Bettz's collection of Maltese fossils would have eliminated the problem of his vague terminolgy. Unfortunately however, his collection could not be located. A fruitless search for it was also made at the Collegio Nazzareno, to which reference is made in the Manuscript.

In addition to the many attributes which Bettz must have had in the field of scientific knowledge, he seems to have been also fully aware that different places on earth have different fossils, for he records that what Maltese fossils have in common with those of other regions is merely their great antiquity and the evidence which they provide of the great upheavals that must have taken place on Earth throughout geological time (p. 16).

The solution to Bettz's real identity and the reason for his name not appearing in any of the official records of the Order, was discovered (?) only lately (1980) following enquiries carried out at the Bayerisches Hauptstaatsarchiv, München, Bavaria. Dr Wild, the Archivdirektor of this Institution, informed the author (28) that the name BETTZ is almost certainly another form for the German PETZL (PETZEL, PEZL) and supported his view by providing biographic annotations on Professor Joseph Petzl contained in the following two publications: *Zeitschrift für Baiern und angränzende Länder* (1817) (29) and Baader's *Lexicon Verstorbener Baierischer Schriftsteller des 18. und 19. Jahrhunderts* (1825). (30) These documents seem to indicate that "Abbate Bettz, Gerosolimitano Bavaro" and "Professor Joseph Petzl, Akademiker und Lehrer der Naturgeschichte" are almost certainly one and the same person. Indeed, like "Bettz", Professor Petzl was a priest of Bavarian origin in the Order of St. John of Jerusalem, he was in Malta at the time Bettz deliverd his lecture on Maltese fossils at the Accademia Letteraria, like him he engaged himself in the study of local natural history and built himself a collection of Maltese fossils and was most interested in molluscs.

Being now aware of Petzl's prolonged and intimate connections with Munich, the author lately (1981) carried out attempts to locate the collection of "Abbate Bettz" or of Professor Joseph Petzl at the Bayerishches Staatssammlung für Paläontologie und Historische Geologie, München. It was argued that Petzl's collection — particularly the similarity of its echinoids with those

28. Letter dated 21.1.1980

29. *Zeitschrift für Baiern und angränzende Länder*, Band II, s.368-370, München 1817.

30. BAADER, Clemens Alois, *Verstorbener Baierischer Schriftsteller des 18 und 19 Jahrhunderts*, Band II, Augsburg/Leipzig 1825. Professor Joseph Petzl: pp.245-247.

listed in Bettz's manuscript, the nomenclature used on their labels and the calligraphy in which these names was written — would give valuable information to confirm or disprove the identity of Bettz and Petzl. Unfortunately, however, no Maltese echinoids could be traced in that institution and there is no record there to show that a collection belonging either to "Abbate Bettz" or to Professor Petzl was ever housed in that Museum. It is possible that such a collection was destroyed along with other fossils and the relative documentation (catalogues, inventories and other information) during the bombardments of Munich in 1944. (31) During World War II, the most important fossil material (types and figured specimens) and much of the rich library of the Bavarian State Collection of Palaeontology and Historical Geology in Munich was packed in crates and stored safely in various Bavarian Castles. All the remaining material, including probably, Petzl's Collection and the relevant documentation, was completely destroyed during the bombing of Munich on the memorable night of 24th/25th April, 1944. (32)

A specimen of Professor Petzl's handwriting was located at the Central-Schul-und-Studienbureau des kgl. bayer. Ministeriums des Innern richtete and was made available for study through the kindness of Herr Höppl, Archivist, Bayerisches Haupstaatsarchiv, München. This manuscript document (Reg. No. MInn. 23095) is dated 1890, is in the hand of Professor Joseph Petzl and carries his signature.

There is a gap of fifteen years between this document and Ms. 349, but the differences in the calligraphy are too marked and radical to be attributed merely to time lapse. They seem to indicate a different hand rather than a development or degeneration of the handwriting. This however, does not necessarily exclude Professor Petzl's possible authorship of the lecture, but might indicate that Ms. 349 is a copy of the original text. It is not likely that the Manuscript is a transcript of what "Bettz" said to his distinguished audience at the "Accademia Letteraria di Malta" on the sixth day of October 1794.

#### Biographical Note:

Professor Joseph PETZL was born at Zamberg in Bavaria on 26th August 1764 and died of apoplexy at München on 7th April, 1817. His studies were carried out at Freising (1777—1780), Salzburg (1781-82) and finally at Ingolstadt University, from where he obtained a Doctorate in Philosophy and Theology in 1783.

31. Personal communication: Dr Peter Schröter, Konservator, Anthropologische Staats-sammlung, München. Letter dated 18 September, 1981.
32. WELLNHOFER, P. The history of the Bavarian State Collection of Palaeontology and Historical Geology in Munich.

*J. Soc. Biblphy nat. Hist.* (1980) 9 (4):383-390. Lond. April 1980 p. 387.

On December 22nd, 1787, he became a "Weltpriester" and three years later (1790) joined the Order of St. John in Bavaria as a Deacon or Chaplain. He then left immediately for Malta, the headquarters of the Order, to carry out his novitiate, the statutory Residence, and the Caravans at sea. Both during this period and also after the completion of his above-mentioned duties, Petzl's services as a priest were sought whenever there was an execution.

Bettz's stay on the Island lasted from 1790 to 1799, during which period he is recorded as having "engaged himself in the study of local Natural History and to have built himself an extensive shell and mineral collection and to have produced numerous drawings". (33)

Though the French took possession of Malta in 1798, Petzl is recorded as having returned to his native Bavaria in 1799 to take over the commandery of the Maltese Order in Mörschenfeld (awarded to him in 1797). At that time the headquarters of the Order were in München, and in 1803 he assumed command of the Maltese Religious Order at Altenötting and also of the priests' residence at the place of pilgrimage. This commandery he retained until the abolition of the Bavarian Langue of the Order on September 8th, 1808.

In the meantime, in 1802, Petzl became a Member of the Academy of Physical Sciences in Munich, and in 1804 a Lyceum Professor of Physics and Natural History. The Royal General Mining Administration entrusted him also with the Mineralogy classes of its mining students.

Following the re-organization of the Royal Academy in 1800, Petzl was made honorary Member of the Mathematics and Physics Section and was appointed Curator of the Mineralogical Collections, of which he subsequently produced a descriptive systematic catalogue.

Besides being a man of very wide knowledge, great honesty and unstinting diligence, Joseph Petzl had also an unpretentious character. He died of apoplexy on April 7th, 1817, at the relatively young age of 52 years.

Baader (1825, pp. 246-247) lists twelve publications to the credit of Joseph Petzl, but none of these relates to Maltese fossils.

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