

Title: Collecting Women in Geology: Opening the International Case of a Scottish ‘Cabinetière’, Eliza Gordon Cumming (1815-1842)

Short Title: Collecting Women in Geology

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Abstract:

The double meanings of ‘case’ in the sub-title pinpoint the dual investigations of this chapter. It first puts the case for better understanding of women’s contributions to ‘serious’ geology in international, as well as national, contexts by overtly collecting British women collectors in the field who contributed to French geological knowledge. It can then unpack the pivotal importance of women’s geology collections and women collectors ‘at home’ in the establishment of new global subfields of geological work in the 1840s, despite more famous names being given national and international recognition for key discoveries. Our examination of the geology case in point – the collection and its expert collector, Lady Eliza Gordon Cumming – discloses her international geological expertise, but also longer transnational heritage of women’s scientific collecting practice. By proposing the French term, ‘cabinetière’, to name its clearer status, the chapter investigates the implications of serious retrospective relabeling for geology when a woman *discoverer* collector is restored and reconnected to her world collections.

Keywords: Eliza Gordon Cumming, fossil fish, Louis Agassiz, cabinetière

In celebrating the centenary of the first women Fellows of the Geological Society of London, this chapter reopens and extends the important research on the ‘roles of women in the history of geology’ collected in the volume of the same title (Burek & Higgs 2007). The strategic question and challenge still to be addressed is how the many unheralded, subject-defining, women in pre-twentieth-century geology – those ‘unofficial fellows’ in its formative history – can better be identified, acknowledged and given their due official-scientific and public recognition. Modern re-inventorying of a woman ‘fossil hunter’ such as Mary Anning (1799-1847) as a ‘palaeontologist’ in all but name, to retranslate the terminology of her times as ‘greatest fossilist’

(Torrens 1995) into ours, only partly resolves the larger problem of women's exclusions and omissions from the history of science, including geology. Especially when also hidden in plain sight as footnotes in the work and works of key men in their fields, the fate of women in pre-twentieth-century geology is double. If theirs are confined to supporting secondary, rather than leading primary roles through familial relations with more famous geologist fathers, husbands and brothers (Abir-Am & Outram 1989), their expertise also remains framed within the domestic, rather than the public, professional and international sphere of these alliances. Never 'proper' geologists in their own right, such women then also depend on modern rescuers with greater or lesser unconscious bias regarding the plural histories of the geological sciences. Take Anning's work and exclusions from 'geology' by sex, class, creed and education. Her example is now widely explained, collected, popularized and reframed through recognition narratives (Cave 1988), or foundling identification stories (Robert 1972) that reveal the true riches despite the rags. These powerful cultural storylines then counter-productively re-domesticate major women such as Anning, as well as her higher-born sisters in science like Mary Somerville (1780-1872), as rescued maiden exceptions within the history of British (gentlemanly) geology. To account for a woman's scientific contribution in/as a (separate) domestic sphere avoids wider investigation of her public-international participations, and primary agency in serious science, i.e. understood to be without sex (class, or nationality).

This chapter challenges such reductive two spheres/separate spheres models for women's major scientific contributions by first reassessing the parameters for serious early-nineteenth-century geology in the field, irrespective of sex, to reframe the space for women's primary and co-equal contributions to it. If they work as principal agents in (national) geology, this then also positions them potentially at its international forefronts, because women's cultural education in the gentlemanly class included knowledge of Europe's main science vernaculars of the period, French and German. English becomes the *lingua franca* of science only in the early decades of the twentieth century. The rediscovery of several indicative British women in international field geology in its formative period of the 1800s–1840s not only creates an important roster which includes Eliza Gordon Cumming (1815-1842). Our onward focus and case study expands and redirects the work of Creese (2007) and Andrews (1982) to make her better known by specifically examining the roles of serious geology collectors (of both sexes) in this period. The direct consequence of barring women from membership of national geological and other

scientific societies was to give them no official route – via delivery of papers on their own findings then published in official transactions – for due acknowledgement of their scientific discovery, authority and expert status. We illuminate how Eliza Gordon Cumming became nonetheless a foremost (woman) collector in international geology/paleo-ichthyology of the period, including in her curatorship of her own collections, as alternative route for major scientific publication at the global forefronts of her field.

To uncover the international case of Eliza Gordon Cumming's work in paleo-ichthyology in Britain and in France in the 1840s is thus also to rediscover the longer heritages of expert field collecting in women's transnational scientific practices. Their no less 'professional' scientific role, status and pioneering collecting work in the history of geology then needs more formal recognition. In proposing the French term, 'cabinetière' (Gargam, 2009), to spearhead serious onward collecting of other expert women collectors in geology, the chapter unpacks its applications and implications. The reuniting of the *discoverer* collector and her world collections brings more women in geology into the limelight because it necessitates the important retrospective relabeling of major museum geology collections. The result will be the long overdue international public, as well as scientific, recognition of foremost (British) women in pre-twentieth-century international geology.

### *'Serious' (International) Collecting in Geology*

What, then, defines the serious geology collector in the formative early nineteenth-century period for European geology, as different from the dilettante or informed amateur adding to his/her private cabinet of curiosities? Irrespective of particular national context, were protocols in place for determining serious geological collecting practices in the field as distinct from natural scientific or mineralogical collection endeavours also destined for museum collections? Could serious geology collecting already include women in theory, as well as in practice? Alexander von Humboldt's major exploration of South America with Aimé Bonpland in 1799-1804, first published in French, opens with a key passage that offers precise dating of serious geology collecting and collection practice:

Having stated the general object I had in view in my expeditions, I shall hasten to give a **slight sketch of the whole of the collections and observations which we have accumulated,**

**and the union of which is the aim and end of every scientific journey.** The maritime war, during our abode in America, having rendered communications with Europe very uncertain, **we found ourselves compelled, in order to diminish the chance of losses, to form three different collections. Of these, the first was embarked for Spain and France, the second for the United States and England, and the third, which was the most considerable, remained almost constantly under our own eyes.** Towards the close of our expedition, **this last collection formed forty two boxes,** containing an herbal of six thousand equinoctial plants, seeds, shells, insects, **and, what had hitherto never been brought to Europe, geological specimens, from the Chimborazo, New Grenada, and the banks of the river Amazon** (Humboldt 1814, pp. x-xi, emphasis added).

If Humboldt takes the full credit here for securing the first major haul of new geological specimens from the Americas for European science, his reference to ‘maritime war’ (i.e. the Napoleonic Wars) catalogues international conflict as among the many practical realities of scientific journeys overseas that could result in the losses of specimen collections and field notebooks in carefully packed crates. Their waterlogging or loss overboard in storms at sea were regular occurrences, as were pirate attack, shipwreck, and loss of life to ‘native’ attack, accident or tropical illness of the collector. Cultural histories of early nineteenth-century Germany, Britain and France thus categorically deny that women could undertake scientific and geological exploration as discoverer-collectors, because they lacked the necessary scientific education, national and international mobility, and stamina to overcome such adverse physical conditions. Humboldt’s salutary practices here are, however, to diminish *all* loss of scientific collections to history. They therefore apply also to the safeguarding of valuable women collectors. The first practice is to collect in triplicate and in different locations, with the further advantage of trebling dissemination of specimens to allied international jurisdictions and scientific institutions. The second is to specialize in geology strategically among, and connected to, other major domains of specimen collecting. Both provide restoration spaces for the unheralded woman geologist operating at home as well as abroad via her knowledge of languages and collection cultures cognate with geology. Such a multi-informed intercultural mediator will then often display particular resourcefulness in masking, or better offsetting, her own *principal* roles in geological discovery and modes of its publication by aligning them with the dictates of female authorial decorum. Indeed, Humboldt’s ‘I’ as the expert geologist highlights such conventions of ‘offsetting’ in that it stands for the ‘we’ of his co-collector and co-investigator(s). Humboldt could not have undertaken his successful geological mission to the Americas without his chief

botanist, Aimé Bonpland (1773-1858), or their many indigenous guides: these local specimen ‘hunters’ and ‘gatherers’, i.e. collectors in all but name, included members of both sexes.

Humboldt’s record of expert collecting methods and protocols therefore dates ‘serious’ international geology collecting at the late-Enlightenment turn of the German/European nineteenth century. The acclaimed geologist’s name on the publication title page then also cracks open the need for more precise co-collector identification that acknowledges and recognizes secondary men as well as *primary* women in ‘his’ geology overseas and at home. A case in point is Sarah Bowdich (1791-1856) in the history of geology of Madeira in its foundational early nineteenth-century development (Orr 2014). Her training and mentorship under Alexander von Humboldt in Paris in 1819-1823 alongside her husband, T. Edward Bowdich, and widowhood in 1824 resulted in her publication of ‘his’ *Excursions in Madeira and Porto Santo* (1825) in English, but also longer French edition (1826) containing Humboldt’s important epilogue. This evaluates the Bowdichs’ superior mapping of Madeira and measurement of its peaks by comparison with von Buch’s earlier account, and Humboldt’s own on Tenerife *en route* to the Americas.

The occlusion of Sarah’s work and major contributions to knowledge of Madeiran geology in modern Anglophone and European history of (women in) geology illustrates how deleterious blind-spots are created when women’s science is limited to secondary status and ‘domestic’ ambits. Even when they published key findings in their own name – as in the case of Maria Graham (1785-1842) (Thompson 2012) [see chapter x in this volume] – these are dismissed as not ‘serious’ geology because by a woman. Findings can be overlooked and ignored entirely if penned by a ‘non-national’ woman contributor to world geology such as Sarah Bowdich, who left no legacy of specimen collections and undertook no geological work in Britain or France. If this chapter therefore activates the onward collection of British women contributing to new international knowledge in nineteenth-century geology, it also shifts awareness to the pivotal expertise of their material collecting and collections as on an equal, or more important, footing than publications. Major women *in the field* too readily disappear in their status as footnotes – literal and metaphorical – in the published accounts of significant geological discoveries of the period allegedly all by, and only by, men. For example, Charlotte Murchison’s (1788-1869) more informed interests in geology than those of her famous husband,

Roderick, were recorded in candid correspondence by their peer, Mary Somerville (1780-1872): ‘Our greatest geologist, Sir Roderick Murchison, with his wife, were among the English residents at Rome. At that time he hardly knew one stone from another. [...] Lady Murchison—an amiable and accomplished woman, with solid acquirements which few ladies at that time possessed—had taken to the study of geology; and soon after her husband began that career which has rendered him the first geologist of our country’ (Kölbl-Ebert 1997, p. 39). Let us now look more seriously for women collectors ‘at home’ at the forefront of establishing new global subfields of geology.

*‘Serious’ (International) Collectors in Geology: Double Standards in Cameo?*

The increased prominence and curation of serious geological, as distinct from extensive shell, rock or mineralogical collections in the early nineteenth century also needs more precise dating and understanding. As Kölbl-Ebert (2001, p. 182) noted in the contexts of Germany and Britain

[d]uring the 18th century, women appeared as owners of natural history collections, **some of which have become the nuclei of today’s museum collections**. The beginning of geological research in a modern sense and thus the beginning of geological history occurred around 1800. In Germany, the early professionalisation of geology effectively precluded the collaboration of women, whereas a non-professional culture of natural sciences in Britain stimulated a local ‘Cambrian Explosion’: Women appeared in great numbers as assistants to male relatives, as field geologists, *collectors*, taxonomists, and draughtswomen [emphasis added].

The highlighting of the key position of collectors and collections here is to renegotiate and reshape more carefully Kölbl-Ebert’s overly gendered hierarchies of male and female expertise. As distinct from their leisured counterparts with amateur pastime interests including popularization of geology such as Rosina Zornlin (1795-1859), or ‘fossil shop’ collectors such as Mary Anning making livings from sales (Larsen 2017), serious women ‘collectors par excellence’ in geology like Etheldred Benett (Burek 2001) not only own, but also *curate* their collections. Through their expert work in the field they are in consequence much more than the (secondary) ‘assistants to male relatives’ contended by Kölbl-Ebert above. As specialist taxonomists and often their own preparers and illustrators, such women operated in the same public-national, and potentially international, scientific spheres as their published male collector peers in geology. Take as prime example the Catalogue entitled *Fossil Fish in the Collections of*

*the Earl of Enniskillen and Sir Philip Grey Egerton, Bart*, published in *The Annals and Magazine of Natural History* in 1841 (vol. 7, pp. 487-498). **Fig. 1** reproduces the first page of its 1837 three-page version of the same information digitized in the Ernst Mayr Collections of the University of Harvard (<https://archive.org/details/fossilfishincol00enni/page/n2>). It illustrates the density of its specialist information concerning the ‘Genus and Species’ (rock) ‘Formation’ and ‘Locality’ of the collection that later formed the nucleus of British (Natural History) Museum holdings and exhibits of fossil fish, as Malcolmson (1998, pp. 100-102 & p. 120) elucidates in his cameo of its major nineteenth-century geologist/geology co-collector:

The Third Earl of Enniskillen (1807-1886), MP for Co. Fermanagh, 1831-1840, and Colonel of the Fermanagh Militia, 1834-1875, was a ‘**nobleman of high culture**’, and a **distinguished amateur scientist who travelled throughout the Continent pursuing his geological interests**. These he acquired at Oxford, where he fell under the spell of Dean William Buckland, the University's first Professor of Geology. **The 3rd Earl's bent was practical, not academic. He wrote next-to-nothing on geology, but concentrated on creating an important fossil collection at Florence Court**. There, in 1835, he altered and made fireproof the south pavilion to house his collection, of which he published a catalogue in 1837. **The collection, of almost 10,000 specimens, attracted leading geologists to Florence Court from all over Europe, but was sold to the British Museum (for the huge sum of £3,500) in 1883** -- possibly because he had gone blind in *c.*1870 and could no longer enjoy it. [...] He was given doctorates of law by the Universities of Dublin, Durham and Oxford, and was a Fellow of the Royal Society, a Fellow of the Geographical Society, a member of the Royal Irish Academy, Vice-President of the Geological Society of Dublin (1839-1864) and first President of its successor, the Royal Geological Society of Ireland (1865). [...] **The 3rd Earl's correspondence is almost completely devoid of anything relating to fossil fish and geology.** (emphasis added)

William Cole Third Earl of Enniskillen’s many honours in scientific and geological societies for his world collection of fossil fish were not for his specialist contribution to their science. Rather this ‘voracious collector’ (Trythall 2012, p. 243) for personal prestige in geological science was the recipient of generous gifts of new fossils in 1840 from Lady Eliza Gordon Cumming (1815-1842), his female social counterpart and ‘serious’ geologist foil. The ‘foremost’ collector of fossil fishes of the ‘Old Red’ between 1840 and her premature death in 1842, Eliza is acknowledged precisely by this prefatory accolade in 1844, when the leading world expert in the field, Louis Agassiz (1807-1873) published his *Monographie des Poissons Fossiles du vieux*

*grès rouge ou système dévonien (Old Devonian Sandstone) des Iles Britanniques et de Russie* (p. vii):

Among the recent contributions **that have most added to our knowledge of fossil fishes of the Devonian system, I must accord the foremost place to what Lady Gordon Cumming has undertaken to illustrate this ancient fauna. Not content to collect and disseminate to geologists with a liberality without equal her numerous specimens of these precious remains, which she had extracted from a quarry mined for these purposes, she studied them carefully to set apart the most perfect illustrative specimens, and painted them with detailed precision and artistic talent that few naturalists have been able to attain. Her drawings and those of her daughter, who was her constant assistant in these studies, therefore form the chief ornaments of my monograph.** By delivering this collection to the public, it pains me to think that this noble Lady will no longer be able to receive in person the tribute she so justly merits of the recognition of geologists. May this memory, scattered on her tomb, remind her worthy emulator that her eagerness to assist her mother has contributed to elevating to her a lasting monument in the world of science. (Emphasis added)<sup>1</sup>

This is no woman ‘fossil-hunter’ (Creese 2007, p. 40), or geological amateur with ‘zeal and liberality’ to quote William Buckland’s ‘Anniversary Address to the Geological Society of London’ of 1841, printed in *The Annals and Magazine of Natural History* in 1842:

During the past year **great additions have been made to our stores of knowledge, and specimens in fossil Ichthyology, by the presentation to our Museum of a very large and rich collection of fishes from the lower beds of the old red sandstone near Forres, which we owe to the zeal and liberality of Lady Gordon Cumming of Altyre.**

Her Ladyship and her eldest daughter have further contributed the most accurate and exquisitely finished drawings of the many fossil fishes from the same locality, in illustration of Dr. Malcolmson’s paper on the old red sandstone. These ladies have also supplied many further

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<sup>1</sup> Translations unless otherwise stated are mine. The original is ‘Parmi les contributions récentes **qui ont le plus augmenté nos connaissances sur les poissons fossiles du système dévonien, je dois placer en première ligne ce qu’a fait lady Gordon Cumming en vue d’illustrer cette ancienne faune. Non contente de collecter et distribuer aux géologues, avec une libéralité sans égale, les nombreux exemplaires de ces précieux débris qu’elle faisait recueillir dans une carrière exploitée dans ce but, elle les étudiait avec soin, mettait à part les exemplaires les plus parfaits, et les peignait avec une précision de détail et un talent d’artiste que bien peu de naturalistes ont su atteindre. Aussi ses dessins et ceux de sa fille, qui l’a constamment assistée dans ces études, formeront-ils un des principaux ornemens de ma Monographie.** En livrant ce recueil au public, il m’est pénible de penser que cette noble Dame ne pourra plus recueillir elle-même le tribut si justement mérité de la reconnaissance des géologues. Puisse ce souvenir, semé sur sa tombe, rappeler à sa digne émule que l’empressement qu’elle mettait à seconder sa mère a contribué à lui élever un monument durable dans le monde scientifique!’

drawings to the forthcoming volumes of Professor Agassiz. Further information on the fishes of the old red sandstone has been acquired by the diligent researches and extensive collections made in the same department of Palaeontology by many scientific gentlemen in the counties of Caithness, Elgin, Nairn, Aberdeen, Forfar and Fife: following up the researches that were begun in this almost new and most curious subject by Dr. Fleming, Professor Sedgwick, Mr. Murchison, Dr. Traill, Dr. Malcolmson and Mr. H. Miller. (Buckland, 1842 p. 159)

While Buckland's classifications and acknowledgements of Lady Gordon Cumming and her eldest daughter Seymour are strictly correct – they were the 'most accurate' illustrators for Malcolmson and for Agassiz's *Monographie* of 1844 containing Lady Gordon Cumming's *signed* scientific drawings – his words are very economical indeed with the larger scientific and geological truth. Here on display is Buckland's innate (and indicative gentleman geologist) prejudice against a 'foremost' woman equal in his scientific field in Agassiz's more generous wording, which Buckland had also heard/seen to formulate his report. As the inside title page of Agassiz's *Monographie* makes very clear, the work was written by request of the British Association for the Advancement of Science (BAAS), with extracts presented at its meeting in Manchester in 1842 which Buckland attended. But he, Agassiz, Murchison and others such as Lord Enniskillen had also attended the BAAS meeting in Glasgow in 1840 (Davies 1968), where Cumming's expert collecting work, and liberality in sharing her prized fossil fish specimens, came to 'serious' geological attention.

By contrast with Buckland's reductively derivative portrait of Cumming, Agassiz's more fulsome 1844 cameo encomium endorses her practice of world geology collecting à la Humboldt – multiple dissemination of her collections to other world experts in her field, her specialist work as expert scientific illustrator of her own discoveries (Andrews 1982) – as his equal in scientific knowledge, but not in scientific prerogative. Although her expertise enabled her to 'set apart the most perfect illustrative specimens', in other words to identify and *curate* scientific type specimens that define future classification of fossil species, *his* was to name, describe and publish them for the first time in his *Monographie*, including her first discovery of '*Cheirolepis Cummingiae*. Agass.' and its signed scientific illustration by her also published in his work. The issue of (im)proper labelling, naming and attribution in scientific discoveries and collections by women could not be better epitomized than this example. While Agassiz's Linnaean classification of this species of *Cheirolepis* attributes '*Cummingiae*' to acknowledge its discovery to a 'foremost' woman in geology/paleo-ichthyology, it represents only one of her

many discoveries overtly named for her. The Earl of Enniskillen's 1841 catalogue also includes a specimen – see **Fig. 1** in the centre of the page. Agassiz, however, remains for posterity the recorded scientific expert, 'Agass.', by naming, describing and publishing Cumming's first discovery of this fish among many others. His due acknowledgement of her authority throughout the *Monographie* as the expert *first* discoverer-collector and supplier of his (type) specimen allows him both to credit her work and concurrently to *debit* its pivotal specialist knowledge. Relying upon and deriving from it is his ultimate pronouncement of superior expertise, for example regarding his authoritative understanding of the characteristics of the larger *genus*:

**I established this genus already in 1835 in my *Research on Fossil Fish*, by describing and illustrated the two species then known, the *Ch. Trailli* and *Ch. minor*. Since then, the handsome ['belles'] discoveries by Lady Gordon Cumming in the quarries at Lethen-Bar, in Nairnshire, have brought knowledge of a new species that is admirably conserved, which allows completion of its characteristics, so that the genus *Cheiracanthus* can now be envisaged as one of the best known from this rock formation.** [emphasis added] (Agassiz 1844, p. 44)<sup>2</sup>

Instead of elevating a 'lasting monument' to Cumming's science as his preface claims, Agassiz's 1844 *Monographie* makes her expert collections but the 'Old Red' pedestal upon which he stands as the leading world authority in paleo-ichthyology above other ('local') geologists listed in Buckland's 1842 report. As the cameo of the Earl of Enniskillen further endorses, history of geology then also more fulsomely honours 'gentlemen geology' collections and collecting legacies of a Lord and Baronet such as Sir Philip Egerton as nationally (and internationally) important. Without question – the glaring evidence is Agassiz's *Monographie* – Lady Eliza qualified more substantially than they for Fellow status of the Geological Society of London in 1840, both for her expert geology and for her (private) donations of fossil fish to its specialist collections, except that she was but *Lady Gordon Cumming*.

The social hierarchies and intense rivalries between prominent British men in mid-nineteenth-century geology to establish their places in new sub-fields such as paleo-ichthyology

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<sup>2</sup> J'ai établi ce genre dès 1835, dans mes *Recherches sur les Poissons fossiles*, en décrivant et figurant les deux espèces alors connues, les *Ch. Trailli* et *Ch. minor*. Depuis lors, les belles découvertes de Lady Gordon Cumming, dans les carrières de Lethen-Bar, dans le Nairnshire, ont amené à la connaissance d'une nouvelle espèce admirablement conservé, qui permet d'en compléter tous les caractères, en sorte que le genre *Cheiracanthus* peut maintenant être envisagé comme un des mieux connus de ce terrain. (Ch. V., p. 44).

and the future of its wider fields, explain the entrenchments of cultural double standards regarding the unusual prominent woman (rival) peer also contributing to this geological knowledge. Overly national history of (women in) geology then erases their roles entirely, as **Fig 1** amply illustrates. The lists assume that the science is unequivocally by men on title pages, unless one has wider knowledge that ‘*Cheirolepis cummingiae*’ names an otherwise unacknowledged woman ‘fellow’ in the geological field. Our international optic on Cumming, however, immediately permits retrospective relabeling of her wider importance and roles in and *for* pre-twentieth-century geology when we investigate her case – the material discoveries and the discoverer – through their triple cataloguing by Agassiz, Buckland and Enniskillen & Egerton as dishonorable mentions.

### *Re-curating the Labels*

To date Andrews (1982) provides the most comprehensive account of Cumming’s specimens in the ‘Royal Scottish Museum’ among others, and illustrations in Agassiz’s *Monographie* (1844), but does not investigate his text. This provides further unequivocal evidence for the recovery of Cumming’s ‘foremost’ achievements at the international forefront of ‘Old Red’ paleo-ichthyology. Indeed his text exemplifies, but fails to acknowledge or apply, the logic and import of his doctoral dissertation (Doctor of Medicine at Munich in April 1830) that science has no sex, and that its future is by women: “‘The superiority of woman to man,’ [...] in which he takes the ground that, according to the law of geological progress, woman having been created last was the most perfect being’ (Guyot 1883, pp. 50-51). Electronic availability of the *Monographie* facilitates immediate access to its substantial provenance data. Excluding all references to ‘*Cheirolepis cummingae*’, a word search for ‘Cumming’ reveals Agassiz’s fourteen direct and fulsome acknowledgements of her expert discovery collecting work and collections (pp. 6, 28, 38, 42, 44, 45, 51, 63). Failure to read the text in full, however, means the loss of Agassiz’s six additional major acknowledgements (pp. 12, 13, 14, 16, 17) of the collection, (type) specimens and specialist illustrations by ‘Lady Gordon Cumming’ [sic]. Equally untraceable to electronic searches is information about the foundational impacts of Cumming’s discoveries in Agassiz’s ‘Table synoptique’ of fossil fishes of the ‘Old Red’, collated by *genus*. Thirteen (of the fifteen in total in 1840) belonging to four major genera – see **Table 1** opposite – owe to her extensive

**Table 1**

| <b>Enniskillen and Egerton (1841)</b>                              | <b>Agassiz (1844) Tableau Synoptique</b>  |
|--|---|
| (Formation: ALL Old Reds)<br>Genus and Species:           Locality | (p. 125) <b>CEPHALASPIDES</b>   |
| p. 3 Pterichthys cornutus   Lethen                                 | PTERICHTHYS PRODUCTUS Ag.— <i>Agass.</i> Monogr. du syst. dévon. Tab. 5 Lethen-Bar, Nairnshire  |
| p. 3 Pterichthys latus       Lethen                                | “       LATUS Ag.— <i>Agass.</i> Monogr. du syst. dévon. Tab. 3, fig. 3 et 4. Lethen-Bar  |
| p. 3 Pterichthys productus   Lethen                                | “       CORNUTUS Ag.— <i>Agass.</i> Monogr. du syst. dévon. Tab. 2. Lethen-Bar  |
| p. 1 Coccosteus oblongus   Lethen<br>X                             | (p. 126) COCCOSTEUS OBLONGUS Ag.— <i>Agass.</i> Monogr. du syst. dévon. Tab. 11, Tab. 30a fig. 2. Lethen-Bar<br>“       MAXIMUS Ag.— <i>Agass.</i> Monogr. du syst. dévon. Tab. 30a fig. 17 et 18 Lethen-Bar  |
| p. 1. Cheiracanthus microlepidotus<br>Lethen                       | <b>ACANTHODII</b><br><br>CHEIRACANTHUS MICROLEPIDOTUS Ag.— <i>H. Miller</i> , Old Red, Tab. VII, — <i>Agass.</i> Monogr. du syst. dévon. Tab. 30a fig. 17 et 18 Lethen-Bar, Cromarty  |
| p. 1 Diplacanthus longispinus<br>Lethen                            | (p. 127) DIPLACANTHUS STRIATULUS Ag.— <i>Agass.</i> Monogr. du syst. dévon. Tab. 13, fig. 3 et 4 Lethen-Bar   |
| p. 1 Diplacanthus striatulus   Lethen                              | “       LONGISPINUS <i>Agass. H. Miller</i> , Old Red, Tab. VIII, fig. 1 et 3 — <i>Agass.</i> Monogr. du syst. dévon. Tab. 13 fig. 5, Tab. 14, fig. 8 et 9. Cromarty, Lethen-Bar.   |
| p. 1 Cheirolepis Cummingiae<br>Lethen                              | CHEIROLEPIS CUMINGIAE [sic] Ag. <i>H. Miller</i> , Old Red, Tab. VI — <i>Agass.</i> Monogr. du syst. dévon. Tab. 12. Lethen-Bar, Cromarty.  |
| p. 2 Osteolepis major       Lethen                                 | <b>DIPTERINI</b>  |
| p. 1 Diplopterus microcephalus<br>Lethen                           | OSTEOLEPIS MAJOR Ag. <i>H. Miller</i> , Old Red, Tab. IV — <i>Agass.</i> Monogr. du syst. dévon. Tab. 19, fig. 1-3, Tab. 28a, fig. A. n; Tab. 31a fig. 8-13. Lethen-Bar, St-Petersbourg, Kokenhusen.<br>DIPLOPTERUS MACROCEPHALUS. Ag. — <i>Agass.</i> Monogr. du syst. dévon. Tab. 16 et 17 et Tab. 31a, fig. 4-7. Lethen-Bar, St-Petersbourg, Printschka. |
| p. 2 Glyptolepis leptopterus   Lethen<br>X                         | (p. 128) <b>COELACANTHI</b><br><br>GLYPTOLEPIS LEPTOPTERUS Ag. — <i>H. Miller</i> , Old Red, Tab. V, fig. 2-6 — <i>Agass.</i> Monogr. du syst. dévon. Tab. 20 et 21. Tab. 21a, fig. 4, Tab. 31a, fig. 24. Lethen-Bar, Dipple (Elgin), St-Petersbourg.<br>“       MICROLEPTODOTUS Ag. — <i>Agass.</i> Monogr. du syst. dévon. Tab. 21a. fig. 3-7. Lethen-Bar |
| © Mary Orr   |   |

specialist collecting work from the Lethen-Bar quarries representing the ‘liberality of Lady Gordon Cumming of Altyre’ (Buckland 1842). Agassiz’s text thus also unequivocally disambiguates the ‘confusion’ of provenance – ‘Altyre and Lethen Bar, two Middle Old Red Sandstone fish localities?’ (Andrews 1983) – in Anglophone study: all thirteen came from ‘Lethen-Bar’. Collocation of this place of discovery with their first woman *discoverer* then allows us to reread the alphabetical three-page Enniskillen and Egerton catalogue very differently. As the left column in **Table 1** shows, *eleven* fishes with ‘Lethen’ as their locality in the Florence Court collection map directly onto Agassiz’s thirteen with known discoverer provenance. Indeed, Agassiz’s text also confirms Cumming’s specimen donations to Lord Enniskillen and ‘Sir Philipp [sic] Egerton’ (1844, pp. 14, 28, 38, 42, 64) respectively for *Pterichthys productus*, *Cocosteus oblongus*, *Cheiracanthus microlepidotus*, *Diplacanthus striatulus* and *Glyptolepis leptopterus* as well as for *Cheirolepis Cummingiae*. Agassiz’s further cross-referencing of text with the accompanying specialist images then reveals only some with Cumming’s name on the drawing (for example *Pterichthys productus* and *Cheirolepis Cummingiae*), although careful reexamination of drawing style again re-curates those by their apparently ‘anonymous’ originator(s), Eliza and Seymour Cumming.

Lady Gordon Cumming is therefore no decorative, supporting (secondary) illustrator (Buckland, 1842) of ‘eminent’ geology as variously undertaken in its formative period by the owner-collector William Cole Earl of Enniskillen, Geological Society President William Buckland or world authority Louis Agassiz. None could have made his public reputation without the fundamental specialist collecting work and publications in paleo-ichthyology of the ‘Old Red’ of ‘secondary’ men of national importance such as Drs Fleming, Malcolmson and Traill and Mr. Hugh Millar, or of principal, and principled, women like Cumming unstintingly sharing her expert geological knowledge through donation of type specimens and specialist illustrations. Indeed without her work Agassiz could not have published new descriptions in the 1844 *Monographie* that define key *genera* in what science today recognises as evolutionary fish biology. If Cumming alone of his major informants could not publish her geology in her own name, she did the better thing as a serious geology collector for the futures of international geology. Her Humboldtian expert dissemination of her collections and specialist drawings of them to all known international as well as national experts in her field furthered the reach and

significance of her work for new discoveries, and their identification, in other regions of the globe.

Agassiz's 'Tableau synoptique' in **Table 1** therefore further attests to Cumming's seminal collecting as benchmark for all further comparative study of the *Dipterini* and *Coelacanthi*. Similar findings by Roderick Murchison (1792-1871) and Count Alexander von Keyserling (1815-1891) – collocating with 'St-Petersbourg', 'Printschka' in the synopsis – complement those at 'Kokenhusen' by General the Baron de Löwenstern (1776-1858) (Agassiz 1844, p. 138). The primacy of the 'Lethen-Bar' discoveries, therefore, like their geology collector can only be more fully accounted for when their subject-defining place is fully named, recognized and relabelled for itself, and for its implications in others' private, national and international collections. Eliza is no 'poor Lady Cumming Gordon [sic] who was to say "I am so *envied* for we live upon the beds of fossil fish"' (Letter from Charlotte Murchison to Lady Morgan, 22 Sept. 1858 quoted in Collie & Diemer 1995, p.15). Rather she was proactive as a 'foremost' agent to assure the international reach and renown of this (and her) geology.

Uncovering the international case of Eliza Gordon Cumming's work in paleo-ichthyology in Britain and in France in the 1840s should not, however, make of her some unique female 'phenomenon' requiring rescue for the history of British gentlemanly, or French 'professional' geology. Her Scottish Enlightenment collecting pursuits – in botany and other fields as well as paleo-ichthyology – more seamlessly rediscover her shared heritages of expert field collecting with European women's transnational scientific practices. Their no less 'professional' scientific role, status and pioneering collecting work, including teaching of other women, then needs more formal recognition and status, to spearhead serious onward collecting of other expert women collectors in pre-twentieth-century geology. Eliza Gordon Cumming's premier collecting and collections supremely qualify her as a 'cabinetière', the term coined by Adeline Gargam (2009) for expert female collector-practitioners in late eighteenth-century France curating major anatomy collections. Although they could not be called 'anatomists' these women owners of 'cabinet-laboratories', as opposed to cabinets of curiosities for social display, enjoyed a specialist status endorsed by the visits and consultations of their expert male peers, who alone enjoyed official status and qualifications. The private correspondence of one or other party (or mutual friends and peers) reveals the record for Gargam's study of collaborative exchanges between

equals in expertise. Their correspondence also provides evidence that cabinétières were the main conduit of inspiration and expert instruction for other women of their social circles with similar scientific interests. As status and model for expert female scientific comportment the term, cabinétière, provides a suitably transnational professional label in the main science vernacular of Cumming's day for collecting other women at the forefront of their field only given glancing mention in the work(s) of (ungentlemanly) geologist peers.

### *Conclusions*

To celebrate the first women fellows at the Geological Society of London on 21 May 2019 the different oral version of this chapter undertook to name, recognize and differently curate Cumming. By returning to the Society its own report in 1842 by Buckland of her major contributions to (British) geology was also to unpack behind it the even greater international significance of Agassiz's acknowledgements in print of her 'foremost' case (collections and collector). National and international re-collecting Cumming is not enough, however, in the Society's conservation of its Agassiz collections (see <https://www.geolsoc.org.uk/Library-and-Information-Services/Exhibitions/Louis-Agassiz-Fossil-Fish>) or in the history and roles of women in pre-twentieth-century geology. As argued in this chapter, to open the international case of Cumming as an expert cabinétière is everywhere to shame (further) unquestioned naming of discovery work in geology in its formative period as by men, or if by women then only in token, domestic capacities. To take seriously the primary women in pre-twentieth-century geology such as Cumming for the path-breaking roles they played is to draw some serious conclusions for directing further work on women's history-making in geology.

First is the importance of international frames of reference for recalibrating national narratives of (women's) discovery. If Creese (2007) set out the responsibility of re-collecting women like Cumming as a 'fossil hunter', the label denies such figures the quality of 'serious' geology collecting work. This chapter calls for the rewriting of women's greater place, status and stature within it through larger contextual understanding of women's collecting cultures in science as cabinétières engaged at the forefronts of particular specialist fields and their international networks.

Second, there can therefore be no benign, or accidental, omission and suppression of women's endeavours in geology when major expert parties – such as the Earl of Enniskillen, Buckland, Murchison, Agassiz in the case of Cumming – all knew the others had also been the direct beneficiaries of her immense scientific generosity and expertise. Each variously credited his own position and authority by respectively ignoring, downplaying, side-lining or overwriting hers, *because* of her known importance as their qualified equal or, indeed, superior in knowledge. This chapter argues that such 'minor' credits to women in acknowledgements, footnotes and other reference matter in the work of key men can now paradoxically serve as major alerts for informed modern readers. These alerts signal where to restore to history of the sciences, including its feminist historiography, the many undue *debts* in (inter)national accounting of women's major geological endeavours. The unconscious biases that determine 'serious' science in every era derive from sociocultural assumptions and beliefs concerning the gender, but also class and nationality of the authority and status of scientific knowledge.

Third is the related status of the woman collector and of collections as 'secondary' to the more important *publication* work in geology of classification and description. Comparing the collections of the Earl of Enniskillen and Lady Gordon Cumming as (their) collector in this chapter not only highlights why collectors should be treated more equally by gender in the period, but also by the quality of their science informing it. The term 'cabinetière' has the necessary distinction of a term for an expert woman collector of international standing who cannot be secondary as a woman collector.

Finally, multilingual archive work as undertaken above reveals a trove of significant materials that also call for different collecting and curating practices. **Table 1** illuminates **Fig. 1**, to record the original provenance of the NHM's Enniskillen-Egerton collections. It is then possible not only to reconnect the discoveries from 'Lethen' to their first discoverer, but also to bring Cumming's work at the forefront of paleo-ichthyology to public view and rightful prominence, including through re-curating museum labels and display case information. Thanks to Agassiz's published 'metadata' (foreword, descriptions, drawings, synoptic tables, index of species), 'their' specimens can be displayed as Cumming's *first*. Rightful provenance and prominence then also mean returning to the Geological Society of London among other similar national bodies the report by Buckland in 1842 of Lady Gordon Cumming. Had she been Lord

Cumming, she would have immediately been made a Fellow. Her premature death robbed British and international geology of a foremost model of geological patronage as well as ‘matronage’ (Strobel, 2005-2006). Cumming’s unstinting devotion to serious geology in Humboldtian collecting mode through her multiple curation and widest international expert dissemination is also a cameo of best practice in the science of geology without sex. Generosity rather than rivalry guarantees science for long posterity that includes informing the work of peers in the field and the training of women as disciples. In mentoring her daughter, Cumming knew exactly what, how, but also why to draw, to link their names indelibly into the history of geology, despite its male-redacted publications and reports by official Fellows. In 2019 we can therefore now restore and re-curate Cumming to a more rightful place as a foremost ‘unofficial’ fellow of the Geological Society of London among many similar overdue honours and international accolades that make her a touchstone for women’s primary roles in geology.

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Fig. 1:

# FOSSIL FISH

IN THE COLLECTIONS OF  
THE EARL OF ENNISKILLEN AND SIR PHILIP GREY EGERTON, Bart.

| GENUS and SPECIES.                  | Formation.        | Locality.    | GENUS and SPECIES.                   | Formation.        | Locality.    | GENUS and SPECIES.                  | Formation.         | Locality.      |
|-------------------------------------|-------------------|--------------|--------------------------------------|-------------------|--------------|-------------------------------------|--------------------|----------------|
| <i>Acanthoderma spinosum</i> ...    | Black schist..... | Engi.        | <i>Carcharias grosseserratus</i> ... | Tertiary beds ... | Maryland.    | <i>Cochliodus oblongus</i> .....    | Carb. Limestone    | Armagh.        |
| <i>Acanthopleurus serratus</i> ...  | Do. ....          | Ib.          | — <i>macrodon</i> .....              | Do. ....          | Ib.          | — <i>striatus</i> .....             | Do. ....           | Ib.            |
| <i>Acanus arcuatus</i> .....        | Do. ....          | Ib.          | — <i>megalodon</i> .....             | Do. ....          | Malta.       | <i>Cœlacanthus gracilis</i> .....   | —                  | —              |
| — <i>oblongus</i> .....             | Do. ....          | Ib.          | — <i>megalotus</i> .....             | Do. ....          | Maryland.    | — <i>granulatus</i> .....           | Mag. Limestone     | Ferry Hill.    |
| <i>Acipenser Toliapicus</i> .....   | London clay ...   | Sheppy.      | — <i>minor</i> .....                 | Do. ....          | Ib.          | — <i>lepturus</i> .....             | Coal shale         | Leeds.         |
| <i>Acerodus Anningie</i> .....      | Lias .....        | Lyme Regis.  | — <i>polygyrus</i> .....             | Do. ....          | Ib.          | <i>Cœlopoma Colei</i> .....         | London clay ...    | Sheppy.        |
| — <i>Brauni</i> .....               | Grés bigarré ..   | Deux Ponts.  | — <i>productus</i> .....             | Do. ....          | Malta.       | — <i>leve</i> .....                 | Do. ....           | Ib.            |
| — <i>Gaillardoti</i> .....          | Muschelkalk ...   | Bayreuth.    | — <i>suberratus</i> .....            | London clay.....  | Sheppy.      | <i>Caturus furcatus</i> .....       | Oolite .....       | Eichstadt.     |
| — <i>gibberulus</i> .....           | Lias .....        | Lyme Regis.  | — <i>macrodon</i> .....              | Do. ....          | Solenhofen.  | — <i>macrurus</i> .....             | Do. ....           | Ib.            |
| — <i>latus</i> .....                | Do. ....          | Ib.          | — <i>maximus</i> .....               | Do. ....          | Ib.          | — <i>microchirus</i> .....          | Do. ....           | Ib.            |
| — <i>leiodus</i> .....              | Great Oolite ..   | Stonesfield. | — <i>pachyrurus</i> .....            | Do. ....          | Ib.          | — <i>pleiodus</i> .....             | Great oolite ..... | Stonesfield.   |
| — <i>minimus</i> .....              | Muschelkalk ? ..  | Axmouth.     | <i>Ceratodus altus</i> .....         | Muschelkalk ? ..  | Aust.        | — <i>gibbus</i> .....               | Do. ....           | Ib.            |
| — <i>nobilis</i> .....              | Lias .....        | Lyme Regis.  | — <i>planus</i> .....                | Do. ....          | Ib.          | <i>Cheiracanthus microlepidotus</i> | Old Red .....      | Lethen.        |
| <i>Acrolepis asper</i> .....        | Kupfer-schiefer   | Mansfeld.    | — <i>minor</i> .....                 | Do. ....          | Stromness.   | <i>Cheirolepis Cummingie</i> ...    | Do. ....           | Lethen.        |
| — <i>Sedgwickii</i> .....           | Mag. Limestone    | Ferry Hill.  | <i>Chimera Agassizii</i> .....       | Green sand .....  | Maidstone.   | — <i>Traillii</i> .....             | Do. ....           | Stromness.     |
| <i>Ætobates irregularis</i> .....   | Loudon clay ...   | Sheppy.      | — <i>brevirostris</i> .....          | Galt .....        | Folkstone.   | <i>Chomatomus cinctus</i> .....     | Carb. Limestone    | Bristol.       |
| <i>Amblypterus eupterygius</i> ...  | Coal formation... | Lebach.      | — <i>Colei</i> .....                 | Great Oolite ..   | Stonesfield. | — <i>linearis</i> .....             | Do. ....           | Ib.            |
| — <i>lateralis</i> .....            | Do. ....          | Ib.          | — <i>Egertoni</i> .....              | Kimmeridge clay   | Shotover.    | — <i>truncatus</i> .....            | Do. ....           | Armagh.        |
| — <i>latus</i> .....                | Do. ....          | Ib.          | — <i>Mantellii</i> .....             | Chalk .....       | Sussex.      | <i>Chondrosteus acipenserides</i>   | Lias .....         | Lyme.          |
| — <i>macropterus</i> .....          | Do. ....          | Ib.          | — <i>neglecta</i> .....              | Great Oolite ..   | Stonesfield. | <i>Cladocycus Gardneri</i> .....    | Chalk ? .....      | Brazil.        |
| <i>Amblyurus macrostomus</i> ...    | Lias .....        | Street.      | — <i>Owenii</i> .....                | Do. ....          | Ib.          | — <i>Lewesiensis</i> .....          | Do. ....           | Kent.          |
| <i>Auenchelum dorsale</i> .....     | Black schist..... | Engi.        | — <i>Towushendii</i> .....           | Purbeck stone ..  | Garsington.  | <i>Cladodus mirabilis</i> .....     | Carb. Limestone    | Bristol.       |
| — <i>Glaristanum</i> .....          | Do. ....          | Ib.          | <i>Chomatomus cinctus</i> .....      | Carb. Limestone   | Bristol.     | — <i>striatus</i> .....             | Do. ....           | Armagh.        |
| — <i>heteropleurum</i> .....        | Do. ....          | Ib.          | — <i>linearis</i> .....              | Black schist..... | Engi.        | <i>Clupea Beurardi</i> .....        | Tertiary beds ...  | Lebanou.       |
| — <i>isopleurum</i> .....           | Do. ....          | Ib.          | — <i>truncatus</i> .....             | Do. ....          | Armagh.      | — <i>brevis</i> .....               | Black schist.....  | Engi.          |
| — <i>latum</i> .....                | Do. ....          | Ib.          | <i>Chondrosteus acipenserides</i>    | Lias .....        | Lyme.        | — <i>catopypoptera</i> .....        | Eocene .....       | Monte Bolca.   |
| <i>Aspidorhynchus acutirostris</i>  | Oolite .....      | Solenhofen.  | <i>Cladodus mirabilis</i> .....      | Carb. Limestone   | Bristol.     | — <i>megaptera</i> .....            | Black schist.....  | Engi.          |
| — <i>Anglicus</i> .....             | Lias .....        | Whitby.      | — <i>striatus</i> .....              | Do. ....          | Armagh.      | — <i>minuta</i> .....               | Eocene .....       | Monte Bolca.   |
| — <i>Comptoni</i> .....             | Chalk ? .....     | Brazil.      | <i>Cladocycus Gardneri</i> .....     | Chalk ? .....     | Brazil.      | — <i>minuta</i> .....               | Eocene .....       | Monte Bolca.   |
| — <i>mandibularis</i> .....         | Oolite .....      | Solenhofen.  | — <i>Lewesiensis</i> .....           | Do. ....          | Kent.        | — <i>Scheuchzeri</i> .....          | Black schist.....  | Engi.          |
| <i>Asteracanthus ornatus</i> .....  | Carb. Limestone   | Armagh.      | <i>Cladodus mirabilis</i> .....      | Carb. Limestone   | Bristol.     | — <i>tenuissima</i> .....           | Pleistocene .....  | Sicily.        |
| — <i>semisulcatus</i> .....         | Great Oolite ...  | Stonesfield. | — <i>striatus</i> .....              | Do. ....          | Armagh.      | <i>Cobitis cephalotes</i> .....     | Tertiary beds ...  | Eningen.       |
| <i>Asteroptychius ornatus</i> ..... | Carb. Limestone   | Armagh.      | <i>Clupea Beurardi</i> .....         | Tertiary beds ... | Lebanou.     | <i>Cocosteus latus</i> .....        | Old Red .....      | Stromness.     |
| <i>Atherina macrocephala</i> .....  | Eocene .....      | Monte Bolca. | — <i>brevis</i> .....                | Black schist..... | Engi.        | — <i>oblongus</i> .....             | Do. ....           | Lethen.        |
| <i>Aulolepis typus</i> .....        | Chalk .....       | Kent.        | — <i>catopypoptera</i> .....         | Eocene .....      | Monte Bolca. | <i>Cochliodus acutus</i> .....      | Carb. Limestone    | Armagh.        |
| <i>Belonostomus acutus</i> .....    | Lias .....        | Whitby.      | — <i>megaptera</i> .....             | Black schist..... | Engi.        | — <i>contortus</i> .....            | Do. ....           | Bristol.       |
| — <i>leptosteus</i> .....           | Great Oolite ..   | Stonesfield. | — <i>minuta</i> .....                | Eocene .....      | Monte Bolca. | — <i>magnus</i> .....               | Do. ....           | Armagh.        |
| — <i>Münsteri</i> .....             | Oolite .....      | Solenhofen.  | — <i>Scheuchzeri</i> .....           | Black schist..... | Engi.        | <i>Cochliodus striatus</i> .....    | Do. ....           | Ib.            |
| — <i>tenellus</i> .....             | Lias .....        | Lyme.        | — <i>tenuissima</i> .....            | Pleistocene ..... | Sicily.      | <i>Cœlacanthus gracilis</i> .....   | —                  | —              |
| <i>Beryx microcephalus</i> .....    | Chalk .....       | Kent.        | <i>Cobitis cephalotes</i> .....      | Tertiary beds ... | Eningen.     | — <i>granulatus</i> .....           | Mag. Limestone     | Ferry Hill.    |
| — <i>ornatus</i> .....              | Do. ....          | Ib.          | <i>Cocosteus latus</i> .....         | Old Red .....     | Stromness.   | — <i>lepturus</i> .....             | Coal shale         | Leeds.         |
| — <i>radians</i> .....              | Do. ....          | Ib.          | — <i>oblongus</i> .....              | Do. ....          | Lethen.      | <i>Cœlopoma Colei</i> .....         | London clay ...    | Sheppy.        |
| <i>Blochius longirostris</i> .....  | Eocene.....       | Monte Bolca. | <i>Cocosteus latus</i> .....         | Old Red .....     | Stromness.   | — <i>leve</i> .....                 | Do. ....           | Ib.            |
| <i>Carangopsis dorsalis</i> .....   | Do. ....          | Ib.          | — <i>oblongus</i> .....              | Do. ....          | Lethen.      | <i>Conodus ferox</i> .....          | Lias .....         | Lyme.          |
| — <i>laticus</i> .....              | Do. ....          | Ib.          | <i>Cochliodus acutus</i> .....       | Carb. Limestone   | Armagh.      | <i>Cottus brevis</i> .....          | Tertiary beds ...  | Eningen.       |
|                                     |                   |              | — <i>contortus</i> .....             | Do. ....          | Bristol.     | <i>Ctenacanthus brevis</i> .....    | Carb. Limestone    | Bristol.       |
|                                     |                   |              | — <i>magnus</i> .....                | Do. ....          | Armagh.      | — <i>heterogyrus</i> .....          | Do. ....           | Armagh.        |
|                                     |                   |              |                                      |                   |              | — <i>major</i> .....                | Do. ....           | Bristol.       |
|                                     |                   |              |                                      |                   |              | — <i>tenuistriatus</i> .....        | Do. ....           | Ib.            |
|                                     |                   |              |                                      |                   |              | <i>Ctenolepis cyclus</i> .....      | Great Oolite ...   | Stonesfield.   |
|                                     |                   |              |                                      |                   |              | <i>Ctenoptychius apicalis</i> ..... | Coal shale .....   | Stafford.      |
|                                     |                   |              |                                      |                   |              | — <i>dentatus</i> .....             | Carb. Limestone    | Armagh.        |
|                                     |                   |              |                                      |                   |              | — <i>marginalis</i> .....           | Do. ....           | Ib.            |
|                                     |                   |              |                                      |                   |              | — <i>pectinatus</i> .....           | Coal shale .....   | N. Wales.      |
|                                     |                   |              |                                      |                   |              | — <i>radicans</i> .....             | Carb. Limestone    | Armagh.        |
|                                     |                   |              |                                      |                   |              | — <i>sagittatus</i> .....           | Do. ....           | Ib.            |
|                                     |                   |              |                                      |                   |              | — <i>serratus</i> .....             | Do. ....           | Ib.            |
|                                     |                   |              |                                      |                   |              | <i>Cybium macropomum</i> .....      | London clay ...    | Sheppy.        |
|                                     |                   |              |                                      |                   |              | <i>Cyclurus minor</i> .....         | Tertiary beds ...  | Eningen.       |
|                                     |                   |              |                                      |                   |              | <i>Dapedius arenatus</i> .....      | Lias .....         | Lyme.          |
|                                     |                   |              |                                      |                   |              | — <i>Colei</i> .....                | Do. ....           | Ib.            |
|                                     |                   |              |                                      |                   |              | — <i>granulatus</i> .....           | Do. ....           | Ib.            |
|                                     |                   |              |                                      |                   |              | — <i>micans</i> .....               | Do. ....           | Whitby.        |
|                                     |                   |              |                                      |                   |              | — <i>orbis</i> .....                | Do. ....           | Barrow.        |
|                                     |                   |              |                                      |                   |              | — <i>politus</i> .....              | Do. ....           | Lyme.          |
|                                     |                   |              |                                      |                   |              | — <i>punctatus</i> .....            | Do. ....           | Ib.            |
|                                     |                   |              |                                      |                   |              | <i>Dentex breviceps</i> .....       | Eocene.....        | Monte Bolca.   |
|                                     |                   |              |                                      |                   |              | <i>Dercetis elongatus</i> .....     | Chalk .....        | Kent.          |
|                                     |                   |              |                                      |                   |              | <i>Diodon erinaceus</i> .....       | Eocene .....       | Monte Bolca.   |
|                                     |                   |              |                                      |                   |              | — <i>Scilla</i> .....               | Tertiary beds ...  | Malta.         |
|                                     |                   |              |                                      |                   |              | <i>Diplacanthus crassispinus</i> .. | Old Red .....      | Stromness.     |
|                                     |                   |              |                                      |                   |              | — <i>longispinus</i> .....          | Do. ....           | Lethen.        |
|                                     |                   |              |                                      |                   |              | — <i>striatus</i> .....             | Do. ....           | Ib.            |
|                                     |                   |              |                                      |                   |              | <i>Diplodus gibbosus</i> .....      | Coal shale .....   | Staffordshire. |
|                                     |                   |              |                                      |                   |              | <i>Diplopterus borealis</i> .....   | Old Red .....      | Stromness.     |
|                                     |                   |              |                                      |                   |              | — <i>carbonarius</i> .....          | Coal shale .....   | Leeds.         |
|                                     |                   |              |                                      |                   |              | — <i>macrocephalus</i> .....        | Old Red .....      | Lethen.        |
|                                     |                   |              |                                      |                   |              | <i>Dipterus macrolepidotus</i> ...  | Do. ....           | Caitness.      |
|                                     |                   |              |                                      |                   |              | <i>Ductor leptosomus</i> .....      | Eocene.....        | Monte Bolca.   |
|                                     |                   |              |                                      |                   |              | <i>Enchodus halocyon</i> .....      | Chalk .....        | Kent.          |

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