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1 **Rediscovery of fossils from the Middle Gravels and Lower Loam at Barnfield Pit, Swanscombe,**  
2 **Kent (UK)**

3  
4

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7  
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12

13 **Keywords:** Barnfield Pit; Middle Pleistocene; faunal fossils; museum collection; Lower Palaeolithic

14  
15

16 **Abstract:**

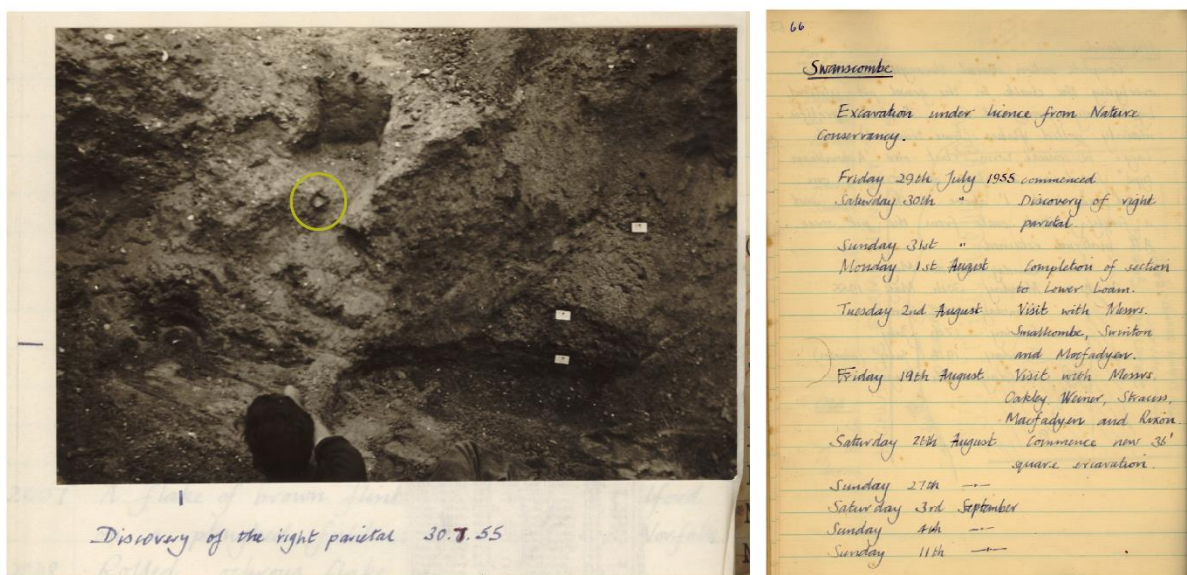
17 Swanscombe is the most important early human fossil site in the UK, and one of the richest locations  
18 for Middle Pleistocene fauna. Famed for three 400,000-year-old hominin skull fragments recovered  
19 from Barnfield Pit between 1935 and 1955, the site is now legally protected and has not seen substantial  
20 excavation for decades. New fossil material from Swanscombe is fleetingly rare. Here we report the  
21 rediscovery of a collection of fossils recovered from Barnfield Pit between 1951 and 1955 by John  
22 Carreck. The 'Carreck Collection' includes multiple mammalian fossils from the hominin fossil and  
23 artefact-bearing Middle Gravels and Lower Loam. Detailed notes contained in the collection reveal that  
24 most were recovered prior to John Wymer's discovery of the third hominin skull fragment on the 30<sup>th</sup>  
25 of July 1955. Several, however, were collected in the months immediately after this, including at least  
26 two fossils recovered from the 'New Skull Site' on the 3<sup>rd</sup> of August 1955. Given their provenance and  
27 the nature of their discovery, these fossils are of significance to the history of British human origins  
28 research. Only a portion of the Carreck Collection, however, is currently accounted for. There is  
29 potential, therefore, for other fossils from Barnfield Pit to be rediscovered, including those with  
30 significance to our understanding of human prehistory in the UK.

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39 **1. Swanscombe and the Carreck Collection**

40 Barnfield Pit, a former gravel quarry in Swanscombe, Kent, is the most important early-human fossil  
41 site in the UK (Wymer, 1968; Roe, 1981; Pettitt and White, 2012). Its significance lays in the discovery  
42 of two ~ 400 thousand year old (Kya) hominin cranial fragments in the 1930s (Marston, 1937), followed  
43 by a third fragment from the same individual in 1955 (Wymer, 1955) (Figure 1). Here we provide a  
44 short communication on the rediscovery of a collection of Middle Pleistocene mammalian fossils  
45 recovered from Barnfield Pit between 1951 and 1955, including those recovered from the hominin fossil  
46 and artefact-bearing Middle Gravels and Lower Loam. Two of these fossils are discussed in detail.

47 The fossils were discovered in a collection of Pleistocene faunal remains known as the ‘Carreck  
48 Collection’ (CC), now housed in the Human Osteology Research Laboratory at the University of Kent.  
49 Originally the private collection of John Norman Carreck (1928-1990), a specialist in UK Pleistocene  
50 fauna (Carreck, 1957, 1972, 1976), the fossils were found in an outhouse at his home (New Hall,  
51 Henfield) on his death. At the invitation of John’s widow (Marjorie), Ed Jarzembowski, the former  
52 Keeper of Natural History at Maidstone Museum, retrieved a portion of the fossils in 2008, with the  
53 rest taken by unknown individuals. The fossils were then donated to the University of Kent for  
54 permanent curation where they remained stored until March 2020. A programme of research is now  
55 underway to catalogue and analyse the fossils.



56  
57 **Figure 1:** The discovery of the third skull fragment at Barnfield Pit on the 30<sup>th</sup> of July 1955 (left),  
58 with the fossil visible in the top left of centre (circled). The first page from John Wymer’s diary  
59 covering his visit to Swanscombe during July and August 1955 (right). These images are available  
60 courtesy of Mephram (2008), the Aggregates Levy Sustainability Fund, and the Wymer Archives.

61  
62 In total, 67 fossils (complete or partial, not including rodent dentition [ $>120$ ]) within the CC retain  
63 diagnostic features that enable species identification, or placement within a genus. Most fossils in the

64 collection originate from four well-known UK Quaternary sites: Barnfield Pit (Swanscombe), Norris  
65 Pit (Slades Green), Wagon's Pit (Aylesford) and Dierden's Pit (Greenhithe). Other than Wagon's Pit,  
66 all span a 6 km stretch of the Thames Estuary in the borough of Dartford (Kent, UK). On recognising  
67 Barnfield Pit and its association with the Swanscombe skull fragments, it was decided that a detailed  
68 analysis of all fossil remains should be undertaken.

69 Of the fossils retaining diagnostic features, 15 are associated with Barnfield Pit, while 15, 8 and 19  
70 come from Greenhithe, Slades Green and Aylesford, respectively. Other Kent sites (e.g. Tankerton Bay,  
71 Whitstable) are represented on an *ad hoc* basis. Diverse fauna are represented at all sites (as determined  
72 by Carreck). Those from Barnfield Pit include *Dama*, *Cervus* and *Bovinae*; all recovered from the Lower  
73 Gravels, Lower Loam or Middle Gravels, which are known to be fossiliferous. These species are  
74 consistent with previous faunal accounts from Swanscombe (Oakley, 1938; Sutcliffe, 1964; Bridgland,  
75 1994; Schreve, 2001; Smith, 2010, 2013). A further 134 fossil fragments from Barnfield Pit were too  
76 small to be reliably identified. Bags of unassigned labels indicate that at least 13 fossils and four  
77 'Clactonian' flakes from Barnfield Pit are unaccounted for in this portion of the CC, including  
78 *Palaeoloxodon*, *Bison*, *Dama*, *Equus*, *Psilunio* and *Cervus* specimens. All specimens were collected in  
79 the Lower Gravels, Lower Loam, and Middle Gravels. Efforts to trace the missing fossils and the rest  
80 of the CC (i.e. those that were not received by Maidstone Museum) are ongoing.

81 Boxes and associated notes suggest John Carreck was actively recovering fossils for his collection  
82 between 1950 and 1955. This includes at Barnfield Pit between 1951 and 1955. Newspaper scraps and  
83 equipment wrappings found within the CC are consistent with these dates. Most fossils retain original  
84 paper notes providing species associations and locations of excavation / recovery. One Barnfield Pit  
85 antler specimen (*Dama*) was added to the collection at a later date, having been found at the top of the  
86 Lower Gravels by M.W. Carreck on 28th October 1969. Other *ad hoc* additions were made to the CC  
87 in later years, including a Swanscombe specimen gifted by Bernard Conway in 1977, who worked at  
88 Barnfield Pit with John Waechter. A single handwriting style is found on most notes and boxes (Figure  
89 3). Fossils in the collection do not appear to have been repackaged since their original discovery. To  
90 our knowledge, no published accounts of the CC exist, and Carreck himself appears to have been the  
91 last to undertake investigation of the fossils.

92

## 93 **2. Carreck's Recovery of Fossils from Swanscombe**

94 Notes within the CC reveal detailed provenance and stratigraphic information for many fossils. Here  
95 we combine this information with other contemporaneous accounts and published literature to shed  
96 light on their recovery and historical importance.

97 Carreck's notes detail his frequent visits to Barnfield Pit between 1951 to 1955. Most likely these visits  
98 occurred while conducting his own excavations at the Baker's Hole Complex 500m east of Swanscombe  
99 (Schreve, 1998; Wenban-Smith, 2001; Scott, 2010), or Dierden's Pit, 500m to the west (Sutcliffe, 1964;  
100 Wymer, 1999). Certainly, Carreck would have been familiar with Pleistocene sites in and around  
101 Swanscombe during the 1950s and 60s (Ovey, 1964; Caiger, 1965; Carreck, 1972; Schreve, 1998;  
102 Wenban-Smith et al. 2001).

103 Subsequent to Marston's discoveries in the 1930s (Marston, 1937), limited work continued at Barnfield  
104 under permits held by John Wymer's parents (Mephram, 2008; McNabb, 2005), but it was not until  
105 Wymer himself re-opened Barnfield Pit in 1955 that new large-scale excavations are known to have  
106 been undertaken (Wymer, 1955, 1968). The Royal Anthropological Institute's 'Swanscombe  
107 Committee', appointed to aid Marston after his first discoveries, do not report any substantive activity  
108 occurring between 1938 and January 1954 (Swanscombe Committee Archives; Ovey, 1964).

109 Accounts from the Swanscombe Committee (active between 1936 – 1964), make no mention of  
110 Carreck's involvement in any capacity (Swanscombe Committee Archives). Nor do the comprehensive  
111 accounts in Ovey (1964), including Sutcliffe's (1964) detailed records on the site's faunal remains.  
112 Indeed, Sutcliffe (1964) lists nine individuals known to have removed faunal fossils from the site prior  
113 to 1955, including John Wymer, John Wymer's father, Michael Kerney, and Louis Leakey, but  
114 Carreck's name is not included. The only references of John Carreck in the Ovey (1964) volume relate  
115 to his possession of a single shrew molar from Dierden's Pit, and his provision of information on the  
116 history of Ingress Vale.

117 Most importantly, Wymer's notebooks, which cover his excavations and visits to Swanscombe between  
118 1949 to 2002, make no mention of Carreck at Barnfield Pit (Mephram, 2008; searches for 'Carreck',  
119 'JNC', and variants thereof, along with analysis of all 1950s records relating to Swanscombe). This is  
120 despite Wymer recording who was present at the site on each day of his excavations. No other published  
121 records that we have found detail Carreck's involvement at Barnfield (e.g. Marston, 1937; Oakley,  
122 1952; Wymer, 1999; Roe, 1981; Bridgland, 1994). London's Natural History Museum holds private  
123 correspondence between Carreck and Anthony Sutcliffe dating to 1965, but we are unable to access  
124 these files at present (due to the 2020 COVID-19 pandemic). Multiple individuals with knowledge of  
125 Swanscombe, including those familiar with John Wymer and his time at Barnfield (through later work  
126 and personal communications, not the original excavations), have also indicated no knowledge of  
127 Carreck undertaking work at Barnfield Pit during the 1950s (although they did note his later work at  
128 Dierden's Pit and Baker's Hole).

129 It is unclear how Carreck came to be in possession of a collection of Middle Pleistocene fossils from  
130 Barnfield Pit. We do not think that Carreck's recovery of these materials was surreptitious; excavations  
131 at Swanscombe and elsewhere are known to have been informal affairs during the 1950s (Ovey, 1964;

132 Mephram, 2008). Moreover, Carreck was known in the Quaternary community at the time (Ovey, 1964),  
133 and certainly by John Wymer in later years (Wymer, 1999). At a minimum, however, his collection of  
134 these remains was informal and seemingly unbeknown to those undertaking large-scale excavations.  
135 Carreck's precise role at Barnfield Pit during the 1950s is, therefore, unclear.

136 Information contained alongside the fossils sheds light on the nature of their discovery at Swanscombe.  
137 Here we use two fossils as case studies, describing how they were recovered from hominin-bearing  
138 sediments in-between Wymer's permitted work at the site.

139

## 140 **2.1 A Distal Humerus**

141 The discovery of a fossil identified by Carreck as a portion of a distal humerus is dated to the 2<sup>nd</sup> of  
142 June 1952, with writing on the fossil detailing "*Top of Lower Gravel/Base of L. Loam. Barnfield Pit.*  
143 *2.6.1952.*" (Figure 2). This is consistent with a hand-written note found alongside it (Figure 3), which  
144 reads:

145 *"Mammalian remains from junction*  
146 *of lower loam and lower gravel,*  
147 *Barnfield Pit, Milton Street,*  
148 *Swanscombe, Kent.*  
149 *JNC & MWR. Coll. June 2<sup>nd</sup>, 1952.*  
150 *Elephas cf antiquus tall. Juvenile -----*  
151 *? Sus sp. Shaft of humerus.*  
152 *Cervus sp. Antler tine.*  
153 *Bos or Bison. Fragments of Cranium"*

154 *"And ---- fragments, two*  
155 *indeterminable and one not*  
156 *determined I from the same horizon*  
157 *Also two -----, a valve of*  
158 *Psilunio littoralis (Cuvier), and four*  
159 *waste flakes of the Clactonian*  
160 *Ila industry, all from the Lower*  
161 *Gravels (shell bed at top)"*

162  
163 No official excavations were undertaken at Swanscombe during 1952 (Swanscombe Committee  
164 Archives), although Wymer is known to have visited on January 20<sup>th</sup>, February 10<sup>th</sup> and 16<sup>th</sup>, and August  
165 10<sup>th</sup> of that year (Mephram, 2008). On his August visit, Wymer notes that "many yards of gravel [were]  
166 removed by workmen" (Mephram, 2008: vol 2, page 52) from the section he was excavating in January.  
167 In the 'workmen's "diggings"' (Mephram, 2008: vol 2, page 57a) he found 37 flake artefacts and several  
168 bifaces, indicating a likely mix of Middle Gravel and Lower Loam sediments had been disturbed  
169 (Wymer, 1968), but no fossils. On all dates, Wymer was excavating the fossiliferous Middle Gravels to  
170 Lower Loam. Wymer paid specific attention to the "one minute fragment of bone" (Mephram, 2008; vol

171 2, page 34) that he found on his January visit, indicating his awareness of fossils when digging in these  
172 levels. On the date that Carreck recovered the humerus, Wymer was at Furze Platt (Mephram, 2008).

173 '*Sus sp. Shaft of humerus*' indicates Carreck to have identified the fossil as a humeral shaft, suspecting  
174 it to belong to the genus *Sus*. The fossil is formed of three individual fragments refitted using unknown  
175 adhesive. This appears to have been undertaken soon after excavation as the ink describing its recovery  
176 is written on top of the adhesive (Figure 2). Carreck is known to have experimented with fossil  
177 preparation and preservation techniques (Carreck and Adams, 1969). All fragments appear to have been  
178 collected from exposed in-situ sediments, or nearby, due to the single description and the small size of  
179 some fragments. John Carreck ('JNC') is clearly identified as having found the fossil along with 'MWR'  
180 (later M.W. Carreck). At least four other fossil fragments in the CC, as well as the additional fossils  
181 listed in the note above (which are currently unaccounted for), were found on the same day in the  
182 Barnfield Pit Middle Gravels.

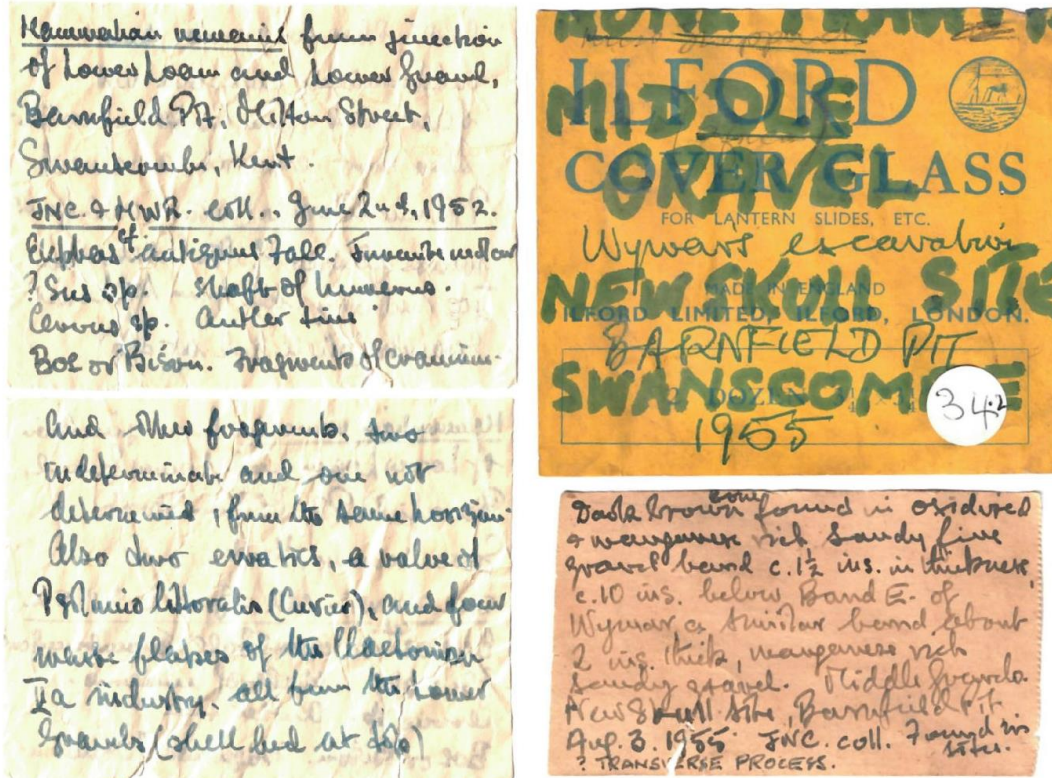
183 Whether Carreck's visit on June 2<sup>nd</sup> resulted in the disturbance Wymer put down to workmen we cannot  
184 say, but the lack of fossils and plentiful lithic artefacts in the 'diggings' heightens this possibility.  
185 Certainly, the CC displays limited evidence of the collection of lithic artefacts, despite their abundance  
186 at Barnfield Pit. Records also detail Carreck as returning to the site and recovering additional fossils  
187 three weeks later.

188



189

190 **Figure 2:** The two case studies used here to highlight the history of the Carreck Collection and John  
191 Carreck's recovery of fossils from Barnfield Pit. The suspected distal humerus recovered from the  
192 junction of the Lower Loam and Lower Gravel is on the right, while the suspected transverse process  
193 is on the left. Note that the scales have been inferred from measurements of the fossils, and not scale  
194 bars in the original images.



195

196 **Figure 3:** Carreck's notes found alongside the two case study fossils. Those associated with the  
 197 suspected distal humerus are on the left (see Section 2.1 transcribed text), while those boxed with the  
 198 suspected transverse process are on the right (see Section 2.2 transcribed text).

199

## 200 2.2 A Suspected Transverse Process

201 Two hand written notes found with the fossil, identified by Carreck as a possible transverse process,  
 202 pinpoint its discovery to August 3<sup>rd</sup> 1955, four days after the discovery of the third Swanscombe skull  
 203 fragment (Wymer, 1955). Both notes explicitly link the fossil to the "New Skull Site, Barnfield Pit" and  
 204 Wymer's (1955) excavations of the Swanscombe Middle Gravels (Figure 3). One of the notes  
 205 specifically states the fossil to come from 'Wymar's [sic] excavation New Skull Site', while the other  
 206 describes its in-situ recovery in detail:

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*"Dark brown bone found in oxidised  
 & manganese rich sandy fine  
 gravel band c. 1 1/2 ins. in thickness  
 c. 10 ins. below Band E. of  
 Wymar or similar band about  
 2 ins. Thick, manganese rich  
 sandy gravel. Middle Gravels.  
 New Skull Site, Barnfield Pit.  
 Aug. 3. 1955. JNC. Coll. Found in situ.  
 ? Transverse Process."*



218 The most complete picture of events surrounding the discovery of this fossil comes from combining  
219 Carreck's notes with Wymer's accounts of the skull fragment's excavation. Wymer (1955) found the  
220 third fragment of the Swanscombe skull on July 30<sup>th</sup>, 1955. Two hours later, Alvan Marston arrived and  
221 confirmed the discovery (Wymer, 1955; Mephram, 2008).

222 By August 1<sup>st</sup> Wymer had completed excavation of the skull fragment section to the Lower Loam  
223 (Mephram, 2008). On August 2<sup>nd</sup>, the day before Carreck recovered his fossil, the skull fragment was  
224 moved to the Natural History Museum in London (Wymer, 1955). Wymer's personal notes indicate he  
225 was present at the site on the 2<sup>nd</sup> but did not excavate, after which he did not return again until August  
226 19<sup>th</sup> (Mephram, 2008). Indeed, like most of Wymer's excavations (Mephram, 2008), "work was mainly  
227 confined to week-ends" (Wymer, 1964: 21). Carreck's fossil was discovered on Wednesday the 3<sup>rd</sup> in  
228 the absence of John Wymer, during a new excavation at the New Skull site.

229 During the five days preceding the discovery of the suspected transverse process, Wymer (1955: 427)  
230 noted how "numerous [faunal] bone fragments were found in association with the right parietal". It is  
231 not too surprising then, that Carreck recovered faunal fossils when digging in the same sediments.  
232 Wymer (1955) further notes that any faunal remains found in association with the skull fragment were  
233 transferred to the 'British Museum' (Natural History Museum) in London. Carreck confirms that the  
234 transverse process was found in situ "10 ins. below Band E. of Wymar [sic]", in manganese rich sandy  
235 gravel (Figure 3). This aligns well with the stratigraphic sequences at Barnfield Pit (Wymer, 1964;  
236 Bridgland, 1994). Wymer's assertion that all faunal fossils went to London, combined with Carreck's  
237 excavation being on the first day that Wymer was not on site, raises the possibility that Wymer was not  
238 aware of the fossil's discovery or these new excavations.

239 On the same day that the transverse process was found Carreck recorded another in-situ fossil from the  
240 "New Skull Site". This time a "white bone fragment" (suspected non-human phalanx fragment) was  
241 recorded at a depth of 17 inches below the suspected transverse process (Supplementary Figure 1).  
242 Thus, it appears that Carreck excavated to ~37 inches below the levels that the skull fragment was found  
243 (skull level to Band E [10 inches], Band E to transverse process [10 inches], transverse process to white  
244 bone fragment [17 inches]). Quite astonishingly, this reveals that on the 3<sup>rd</sup> of August, four days after  
245 the most important British human palaeontological discovery of the time, ~37 inches (at a minimum)  
246 of sand and gravels were excavated from the site; seemingly without the directorship of John Wymer.  
247 Due to a partially sloping face, a photo taken on the day of the parietal's discovery (Figure 1) does not  
248 clarify how substantial of an undertaking this was.

249

### 250 **3. The Importance of the Carreck Collection**

251 Barnfield Pit, one of the most important Palaeolithic sites in Britain, was excavated on multiple  
252 occasions through the 20<sup>th</sup> Century (Oakely, 1964; Bridgland, 1994; Conway et al., 1996; Wymer, 1999;

253 Pettitt and White, 2012). Now a Site of Special Scientific Interest, no substantial excavations have been  
254 undertaken for decades and new fossil discoveries are fleetingly rare. When combined with the fact that  
255 a majority of the gravels have been removed for industry, the rediscovery of fossils from Barnfield Pit  
256 is especially important. The historical significance of the CC fossils is further amplified by their  
257 discovery alongside (and even in) John Wymer's excavations. Including those that discovered the third  
258 Swanscombe skull fragment. The palaeoanthropological importance of the CC is reinforced by the  
259 recovery of fossils from the Middle Gravels and Lower Loam, sediments known to contain hominin  
260 fossils and Lower Palaeolithic artefacts.

261 The CC contains fossils recovered from Barnfield Pit deposits dating to Marine Isotope Stage (MIS)  
262 11c, 365 - 424 Kya, and are attributed to a period of relative warmth known as the Hoxnian Interglacial  
263 (Bridgland, 1994; Ashton et al., 2008; Ashton, 2016). The Lower Loam suggests a temperate forested  
264 environment with oak, hazel and alder, and some grasses (Ashton and Lewis, 2012; Ashton, 2016).  
265 Faunal remains, including fallow deer (*Dama dama*), beaver (*Castor fiber*), wild boar (*Sus scrofa*) and  
266 macaque (*Macaca sylvan*), are consistent with this setting (Ashton, 2016). The Middle Gravels indicate  
267 increasingly open conditions, as indicated by increasing horse remains and reductions in fallow deer,  
268 although this is likely only at a localised level (Ashton, 2016). Cooling is suggested to occur towards  
269 the top of the Upper Middle Gravels. Both levels suggest a mixed forest and grassland riverine  
270 environment (Ashton and Lewis, 2012) suitable for Middle Pleistocene hominins (Hosfield, 2016).

271 Barnfield Pit therefore has a demonstrable history of hominin fossils being recovered in its gravels and  
272 evidence of environmental conditions suited to promoting long-term and/or repeated occupation by  
273 Middle Pleistocene hominins. The thousands of Palaeolithic artefacts recovered from the site attests to  
274 their presence (Wymer, 1968; Roe, 1981). We are, of course, lucky to have recovered three hominin  
275 skull fragments (from the same individual no less) from the site (Ovey, 1964; Stringer and Hublin,  
276 1999). Indeed, Wymer (1964:20) notes how much of the gravel from the skull layer "critically near the  
277 previous human finds" was removed by the British Army in 1944 (purportedly to build the famous  
278 Mulberry Harbours used in the Allied invasion of Normandy, meaning that additional skeletal elements  
279 could be encased in concrete and on the bed of the English Channel/*La Manche*). What the CC reveals  
280 is the potential for further fossils with Palaeoanthropological importance to have been recovered in-situ  
281 from the site. If the remaining fossils held in the private collection of John Carreck were found, then  
282 there is potential for Swanscombe to provide new information concerning the occupation of Britain by  
283 Middle Pleistocene hominins.

284

#### 285 4. Conclusion

286

287 A combination of early 20<sup>th</sup> Century quarrying and poorly provenanced hobbyist collecting meant that  
288 only a fraction of the artefacts and fossils from Swanscombe's rich Palaeolithic sites have been retained  
289 in public collections (Sutcliffe, 1964). Barnfield Pit has previously been described as the exception  
290 (Wenban-Smith et al., 2001), with the well-described human paleontological and Palaeolithic finds  
291 underlining the significance of the site. Here we describe the rediscovery of a portion of the 'Carreck  
292 Collection', a collection of Middle Pleistocene mammalian fossils recovered under informal  
293 circumstances from Barnfield Pit between 1951 and 1955. The recovery of these fossils from the Middle  
294 Gravels and Lower Loam, including those excavated at the 'New Skull Site' days after John Wymer  
295 discovered the third hominin skull fragment, highlight their significance to the story of human origins  
296 research in the UK. A programme of research into the Carreck Collection fossils is ongoing.

297

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304

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