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**The Wasps and Bees (Hymenoptera: Aculeata) of the Upland Sites of Brimham Rocks, Caydale, Gundale and Seckar Moor with Woolley Edge Quarry in Watsonian Yorkshire —**

*Michael E. Archer*

**Recorder's Seventh Report of the Aculate Hymenoptera in Watsonian Yorkshire —** *Michael E. Archer*

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**THE WASPS AND BEES (HYMENOPTERA: ACULEATA) OF THE  
UPLAND SITES OF BRIMHAM ROCKS, CAYDALE, GUNDALE  
AND SECKAR MOOR WITH WOOLLEY EDGE QUARRY IN  
WATSONIAN YORKSHIRE**

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Characteristically, the aculeate wasps and bees are active during warm sunny days and, except for the social species, stop foraging activities if the temperature drops too low. Thus with increasing latitude (Archer, 1996a) and altitude it might be expected that the number of species (or species diversity) would decrease. The effect of altitude on species diversity will be investigated for four upland sites in Watsonian Yorkshire.

Brimham Rocks (SE2064) is situated in the natural area of the Yorkshire Dales at an altitude of about 260 m. It has an underlying geology of Millstone Grit, from which some spectacular rock formations have developed. Brimham Rocks is a National Trust property with an area of 157 ha. The moorland is mainly covered by heather and bilberry with scattered oaks and silver birches, and willows in boggy areas. The surrounding slopes are covered by deciduous woodland including oak, birch and rowan. The flowers of the heather, bilberry and willow provide important food sources for the aculeate species. Importantly nesting areas for the subterranean nesting species occur where the sandy soil is exposed, especially heavily used footpaths and at the bases of the rock formations. During May 1982, for example, 105 freshly dug burrows of the mining bee, *Andrena cineraria*, were counted in the sloping ground just below the wall in the front of the house. Further during June 1983 about 120 burrows of several species were counted in the path behind a house.

Caydale (SE5386) is situated in the natural area of North York Moors and Hills at an altitude of 210-250 m. The valley cuts into the Coralline Oolite plateau with good exposures of the underlying Calcareous Grits in old quarries near the top of the valley sides (Atherden, 1985). The dry friable soils of these old quarries provide nesting sites for the subterranean nesters. The valley sides have some dry and damp limestone grassland which is being invaded by hawthorn and ash. The valley bottom around the stream is largely marsh. Some areas of old woodland and isolated trees are present, some of which are dead and now providing nesting sites for the aerial nesters. The flowers of hawthorn, raspberry, dandelion, white clover, rock rose, figwort and even heather are important food resources. The area for study is 49 ha centred around the public footpath, but similar habitats extend over a larger area of private property.

Gundale (SE8089) is situated in the natural area of North York Moors and Hills at an altitude of 130-150 m. The study area of 59 ha consists of a northern section of long narrow exposures of extremely soft sandstone with surrounding herb-rich acid grassland and a southern section of herb-rich limestone grassland openings in the deciduous woodland. The tops of the sandstone exposures are dominated by heather and the bases of the slopes by flower-rich ruderal communities. Shrub hawthorn has also invaded the open areas. Bare soil areas of the limestone grassland and the sandstone exposures provide nest sites for the subterranean nesters.

Seckar Moor (SE3214) at an altitude of 90 m and Woolley Edge Quarry (SE3013) at an altitude of 160 m are both situated in the natural area of the Coal Measures. The underlying geology is Millstone Grit of the Upper Carboniferous. Seckar Moor consists of heath, bog and birch woodland with occasional oak, alder and sallow. The study area of 20 ha is mainly in the open heath habitat which contains much heather and bilberry with some bramble, but the herb flora is poor. The nests of the subterranean nesters are associated with the well-used footpaths, particularly where a small slope or bank has appeared. Woolley Edge Quarry has been abandoned and consists of gritstone crags with sandy

pockets of soil in which subterranean nesters nest. The quarry has some heather and bilberry surrounded by deciduous woodland.

#### METHODS

Between 1974 and 1998, 20 visits were made to Brimham Rocks, distributed throughout the year as follows: April (1 visit), May (3), June (8), July (4), August (3), September (1). Between 1984 and 1998, 13 visits were made to Caydale as follows: May (3), June (4), July (3), August (3). Between 1986 and 1994, 18 visits were made to Gundale as follows: April (1), May (3), June (5), July (4), August (3), September (2). Other people also visited Gundale: W. D. Hincks on 30 June 1956, J. H. Flint on 10 June 1979 and 3 May 1980, R. S. Key on 6 September 1985 and J. D. Coldwell on 19 June 1994. The specimens collected on these visits except *Prionocnemis perturbator* (J. D. Coldwell) and *Hylaeus communis* (W. D. Hincks) have been seen. The remaining specimens collected by W. D. Hincks were found at the University Museum, Manchester. Between 1983 and 1999, 17 visits were made to Seckar Moor and Woolley Edge Quarry as follows: April (1), May (4), June (3), July (5), August (3), September (1). In addition W. D. Hincks visited Seckar Moor on 3 July 1943 and his specimens were found at the University Museum, Manchester except for *Symmorphus bifasciatus*. Unless specifically noted in future Seckar Moor will cover both Seckar Moor and Woolley Edge Quarry. During my visits which lasted for approximately two to three hours, all species of aculeate wasps and bees were recorded (Archer sample) and usually collected with a hand net for identification, except possibly the visits to Brimham Rocks during the 1970s.

In the following account, the nomenclature can be related to that of Kloet and Hincks (1978).

#### SPECIES PRESENT AND SEASONAL PROGRESSION OF SPECIES

A full list of recorded species is given in the Appendix. At the family level, Tables 1 and 2 show the taxonomic distribution of species and records. A record represents a specimen differing in one of the following three variables: name, sex and day of visit. The solitary wasp family, Sphecidae, and the solitary bee families, Andrenidae and Halictidae, are the dominant families in terms of both the number of species and records.

Table 3 shows the number of species and when species were first recorded for each month. The most productive month for the species of solitary wasps at the four sites was July except for Caydale when June and July were particularly productive. Most species of solitary wasps were first recorded either during June (Caydale), or July (Brimham Rocks, Seckar Moor) or both June and July (Gundale). Since June and July are summer months, most species of the solitary wasps would seem to have to wait until the warmer summer months before the adults can become active. During the spring months of April and May very few species of solitary wasps were found and at Brimham Rocks and Seckar Moor no species were found. The most numerous species of solitary wasp recorded from Brimham Rocks was *Crossocerus dimidiatus* which was usually found when hunting for its prey of small flies; from Caydale were *Chrysis impressa* and *Trichrysis cyanea* found on fence posts probably on a mating circuit; from Gundale were *Crossocerus tarsatus* and *C. ovalis* usually at their subterranean nesting sites, and from Seckar Moor, where very few solitary wasps were found, *Lindenius albilabris* was the most numerous species, usually found at its subterranean nesting sites in the very small banks at the side of the path.

The most productive months for the species of solitary bees was June except for Caydale when June and July and Gundale when May and June were particularly productive. Most species of solitary bees were first recorded either during June (Brimham Rocks, Caydale), or May and June (Seckar Moor) or April, May and June (Gundale). Unlike the solitary wasps, solitary bees were present in numbers during both the spring and summer months. The most numerous species of solitary bee recorded from Brimham Rocks were *Andrena fucata*, *A. cineraria* and *Lasioglossum calceatum*; from Caydale *Andrena haemorrhoea* and *Halictus tumulorum*; from Gundale *Andrena haemorrhoea*, *Lasioglossum fratellum* and

TABLE 1  
The number of species of aculeate wasps and bees recorded from Brimham Rocks, Caydale, Gundale and Seckar Moor with Woolley Edge Quarry.

	Brimham	Caydale	Gundale	Seckar
Solitary wasps				
Chrysididae	0	4	3	0
Mutillidae	0	0	1	0
Sapygidae	0	1	1	0
Pompilidae	5	5	7	1
Eumenidae	0	3	2	3
Sphecidae	9	13	14	6
Total solitary wasps	14	26	28	10
Solitary bees				
Colletidae	1	3	2	2
Andrenidae	10	9	13	13
Halictidae	10	11	13	12
Megachilidae	0	2	1	0
Anthophoridae	5	3	7	9
Total solitary bees	26	28	36	36
Total solitary species	40	54	64	46
Social wasps and bees				
Vespidae	4	5	5	3
Apidae	13	11	11	9
Total social species	17	16	16	12
Total aculeate wasps and bees	57	70	80	58

TABLE 2  
The number of records of aculeate wasps and bees in the Archer sample from Brimham Rocks, Caydale, Gundale and Seckar Moor with Woolley Edge Quarry.

	Brimham	Caydale	Gundale	Seckar
Solitary wasps				
Chrysididae	0	13	4	0
Sapygidae	0	1	0	0
Pompilidae	6	8	16	1
Eumenidae	0	3	3	1
Sphecidae	26	20	42	8
Total solitary wasps	32	45	65	10
Solitary bees				
Colletidae	4	7	0	6
Andrenidae	30	23	54	48
Halictidae	32	27	70	39
Megachilidae	0	5	1	0
Anthophoridae	8	6	20	31
Total solitary bees	74	68	145	124
Total solitary species	106	113	210	134

TABLE 3  
The number of species and when species were first recorded per month of solitary wasps and bees at Brimham Rocks, Caydale, Gundale and Seckar Moor with Woolley Edge Quarry.

	April	May	June	July	August	September
No. species						
Wasps						
Brimham	0	0	5	10	5	1
Caydale	–	1	15	14	5	–
Gundale	1	4	12	19	8	5
Seckar	0	0	0	8	2	–
Bees						
Brimham	2	5	17	9	8	3
Caydale	–	8	18	17	6	–
Gundale	10	19	26	12	7	9
Seckar	5	16	25	13	6	–
No. species first recorded						
Wasps						
Brimham	0	0	5	8	1	0
Caydale	–	1	15	8	2	–
Gundale	1	4	10	9	3	1
Seckar	0	0	0	8	2	–
Bees						
Brimham	2	4	13	2	5	0
Caydale	–	8	12	5	3	–
Gundale	10	10	11	2	0	3
Seckar	5	12	12	3	4	–

*L. rufitarse*, and from Seckar Moor *Colletes succinctus*, *Andrena lapponica*, *A. cineraria* and *A. tarsata*. All these species are subterranean nesters and are either found at their nesting sites, e.g. *C. succinctus* and *A. cineraria* in nesting aggregations, or at foraging sites, e.g. *A. haemorrhoea* on hawthorn flowers and *C. succinctus* on heather flowers. Some of the above findings at Caydale, and particularly at Brimham Rocks, must be regarded as provisional – it will be shown later that many further species may be present at these two sites.

#### SPECIES-AREA RELATIONSHIP AND POTENTIAL NUMBER OF SOLITARY SPECIES

The species-area relationship can be found by plotting the number of solitary species recorded at a site against the area of the site, with both the number and area expressed as natural logarithms (ln). Archer (1999) plotted a species-area figure for 18 sites from the north and north midlands of England and found that the points fell on a line indicating a highly statistical significant positive linear relationship. The regression equation for this linear relationship is: in number of species =  $3.84 + 0.11 \times \ln \text{ area (ha)}$ . From Archer (1998a, 2000) the sample can be increased to 20 sites, with no change to the regression equation.

Of the four sites under investigation only the Caydale species – area dot falls within the range of the 20 sites, with the dots for Brimham Rocks, Caydale and Seckar Moor (excluding Woolley Edge Quarry) being below the range of the 20 sites. If a site falls below the range of sites with which it is being compared, this could indicate either more

recording is needed to find additional species, or the site is less favourable for solitary aculeates than the sites with which it is being compared.

To test whether more recording is needed, the potential number of species can be estimated using non-parametric statistical procedures. The presence/absence Chao (in Colwell and Coddington, 1994) and jackknife (Heltshe and Forrester, 1983) estimators have been used, using the software of Pisces Conservation Ltd. The Chao estimate depends on the number of species found and the number of species found only on one (unique species) and two (2-occasion species) visits or samples. The jackknife estimate also depends on the number of species found and the number of unique species. The statistical procedures are run a number of times equal to the number of samples or visits. In practice the software selects 1, 2, etc. samples at random each time calculating a mean estimate of species richness. With a small number of samples the estimates are erratic, but as larger sample sizes are selected the estimates may stabilise giving confidence in the estimates. The estimates with increasing sample size are shown in Figs 1-4 and the estimates from the largest number of samples in Table 4.

TABLE 4  
Non-parametric estimates of species richness of solitary wasps and bees at  
Brimham Rocks, Caydale, Gundale and Seckar Moor based on the Archer samples.

	Chao estimate	Jackknife estimate
<b>Brimham Rocks</b>		
No species – recorded	40	40
– estimated	70	58
95% confidence limits	40-100	48-68
% of estimated species found	57	69
<b>Caydale</b>		
No species – recorded	54	54
– estimated	86	81
95% confidence limits	59-114	65-96
% of estimated species found	63	67
<b>Gundale</b>		
No species – recorded	59	59
– estimated	75	79
95% confidence limits	59-90	68-90
% of estimated species found	79	75
<b>Seckar Moor</b>		
No species – recorded	35	35
– estimated	46	48
95% confidence limits	32-60	41-55
% of estimated species found	76	73

For Brimham Rocks, the Chao estimates do not stabilise (Fig. 1), the two estimates disagree with each other and fewer than 70% of the potential number of species have been found (Table 4). These calculations indicate that more solitary species could be found at Brimham Rocks and further visits should be made. Since it is probably not possible to record all the species from a site, provided the estimates stabilise and the two estimates agree with each other, Archer (in press) arbitrarily decided that sampling could stop when 70% or more of the potential number of species has been found.

For Caydale, the Chao estimates stabilise (Fig. 2), the two estimates are similar to each

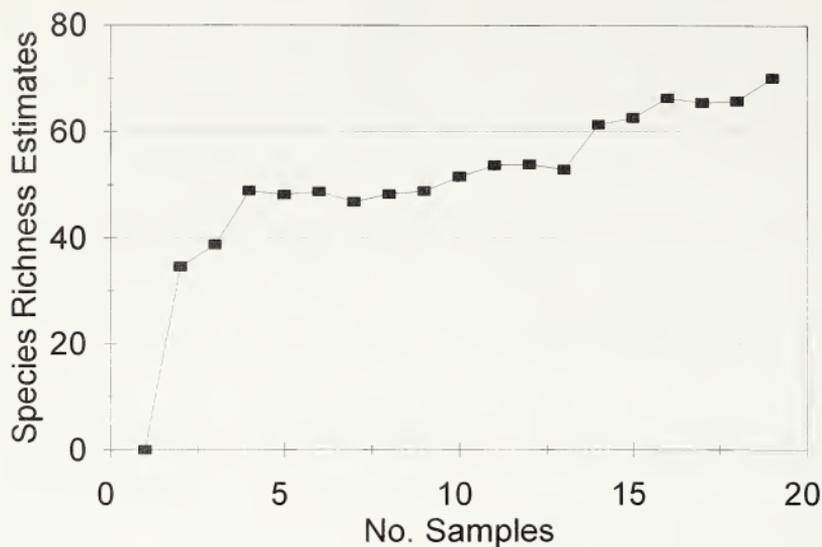


FIGURE 1

The Chao presence/absence estimates of species for Brimham Rocks.

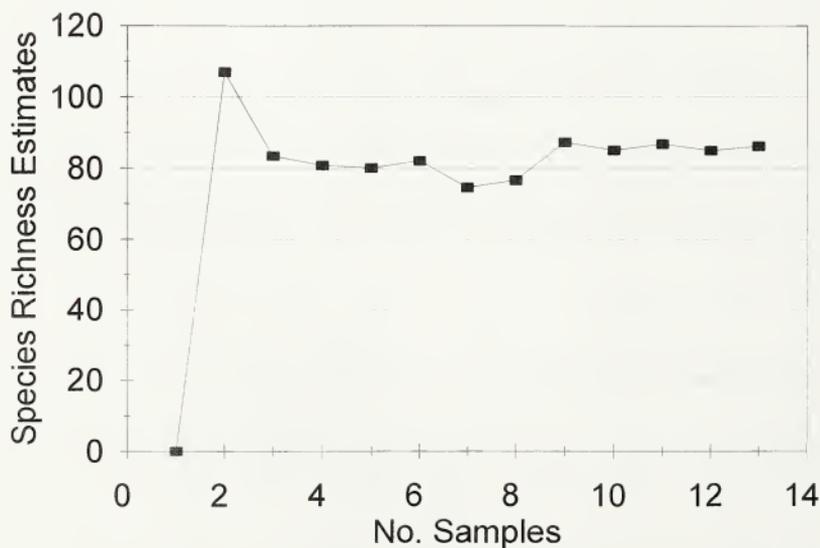


FIGURE 2

The Chao presence/absence estimates of species for Caydale.

other although just less than 70% of the potential number of species have been found (Table 4). Further visits could therefore be made. However the estimates probably refer to a larger area of Caydale than those covered by my visits and, as such, further visits should be made to the private larger area. It is unlikely access will be possible. If the larger area is considered as a truer measure of the area of the site then the dot would fall below the 20 comparison sites on the species-area figure.

For Gundale and Seckar Moor, the Chao estimates stabilise (Figs 3, 4), the two estimates are similar to each other and more than 70% of the potential species have been found at each site.

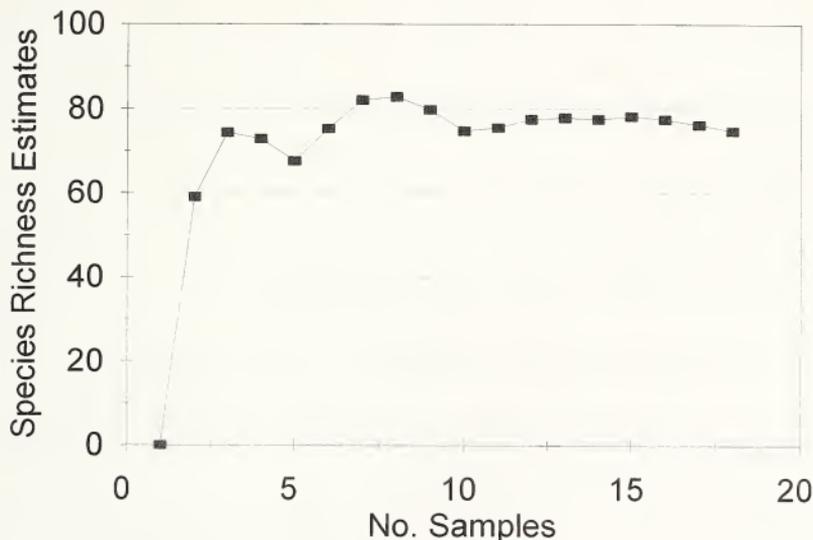


FIGURE 3  
The Chao presence/absence estimates of species for Gundale.

In summary more recording needs to be done at Brimham Rocks, but not at Gundale and Seckar Moor, and probably Caydale, which can be considered less favourable sites for solitary aculeates; this is because of the less favourable weather at a higher altitude rather than the lack of nesting sites and foraging resources which are present. The altitude effect becomes even more noticeable at higher altitude: at Malham Tarn at an altitude of 375 m Hincks (1963) found only three solitary species.

#### SPECIES QUALITY

Three Yorkshire rarities have been found: *Priocnemis susterai* and *Andrena ocreata* at Gundale and *Sphecodes crassus* at Woolley Edge Quarry. *P. susterai* is currently considered to be a southern English species so that the population at Gundale is an isolated one, although the species has recently been found in Nottinghamshire (Archer, 1996b). *Andrena ocreata* extends its range into Scotland. *Sphecodes crassus* is difficult to identify, but current knowledge suggests that this species is at the northern edge of its range in Yorkshire.

Two national rarities have been found (Shirt, 1987; Falk, 1991): *Nomada lathburiana* (RBD3) at Brimham Rocks, Gundale, Seckar Moor and Woolley Edge Quarry, and *Andrena ruficrus* (RDB3) at Gundale. Recent work by the Bees, Wasps and Ants Recording

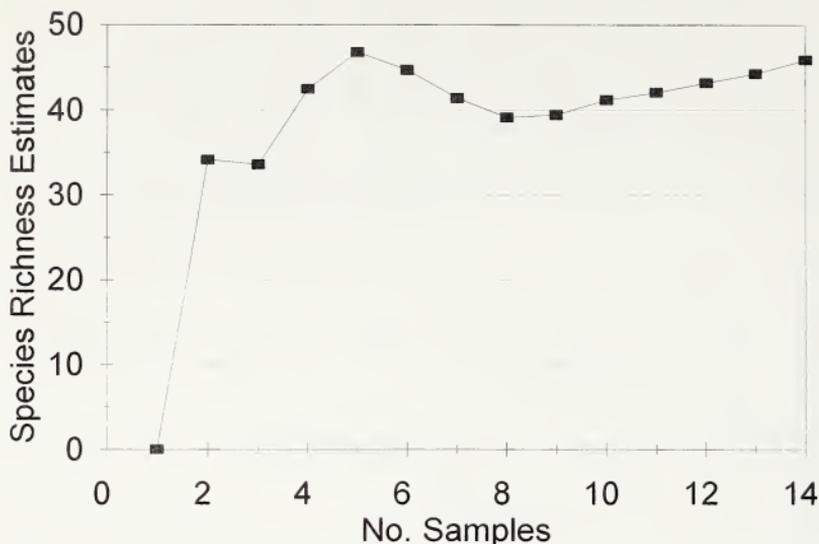


FIGURE 4

The Chao presence/absence estimates of species for Seckar Moor.

Society indicates that the status of *N. lathburiana* should be downgraded. *N. lathburiana* has a "frequent" status in Watsonian Yorkshire and its national distribution is concentrated in northern and western England. In Watsonian Yorkshire *A. ruficrus* is at the southern edge of its range and has an "occasional" status.

According to Falk (1991) three national scarce (or notable, Nb) species have been found: *Sapyga clavicornis* and *Priocnemis schioedtei* at both Caydale and Gundale, and *Sphex crassus* at Woolley Edge Quarry. *S. clavicornis* is at the northern edge of its range and has an "occasional" status in Watsonian Yorkshire. The range of *P. schioedtei* extends into Scotland and has a "frequent" status in Watsonian Yorkshire.

According to Archer (1998b) the following Yorkshire "rare" bumble bees have been recorded: *Bombus magnus* from Brimham Rocks and Caydale, and *B. jonellus* from Brimham Rocks and Gundale. In addition, the "northern local" bumble bee (Williams, 1985), *B. monticola*, has been recorded from Brimham Rocks and Caydale. Brimham Rocks with twelve species of bumble bees is one of the richest sites for bumble bees in Watsonian Yorkshire.

Giving each solitary species a regional status, a regional quality score and species quality score (RSQS) (Archer, 1993) can be calculated for Gundale and Seckar Moor, (Tables 5 & 6). Similar calculations have not been made for Brimham Rocks and Caydale since less than 70% of the potential number of species have been recorded. The RSQS for Gundale is similar to those calculated for Keswick Fitts (2.7), Duncombe Park (2.9) and Blaxton Common (3.1), and the RSQS for Seckar Moor is similar to those calculated for Skipwith Common (2.2), Burton Leonard Lime Quarries (2.3) and Shipley Glen (2.4). Thus Gundale and Seckar Moor in terms of their SQSs are as important as some lowland sites.

Giving each species a national status, a national quality score and species quality score (NSQS) (Archer, 1999) can be calculated for Gundale and Seckar Moor (Tables 5 & 6). In these calculations *Nomada lathburiana* is given a "scarce" status. The NSQS for Gundale is similar to those calculated for Shipley Glen (2.0), Keswick Fitts (2.1) and Shipley Glen (2.4). The NQSQ for Seckar Moor is similar to those calculated for Holmehouse Wood,

TABLE 5  
The regional and Archer national quality scores of the solitary species of wasps and bees recorded at Gundale.

	Status value (A)	No species (B)	Quality Scores (A x B)
Regional Status			
Common	1	32	32
Frequent	2	22	44
Occasional	4	4	16
Rare	8	2	16
Nationally scarce	16	3	48
Nationally rare	32	1	32
Total		64	188
Species quality score $188/64 = 2.9$			
National Status			
Universal	1	43	43
Widespread	2	16	32
Restricted	4	1	4
Scarce	8	3	24
Rare	16	0	0
Very rare	32	1	32
Total		64	135
Species quality score $135/64 = 2.1$			

TABLE 6  
The regional and Archer national quality scores of the species of solitary wasps and bees recorded at Seckar Moor with Woolley Edge Quarry.

	Status value (A)	No species (B)	Quality Scores (A x B)
Regional Status			
Common	1	25	25
Frequent	2	12	24
Occasional	4	7	28
Rare	8	0	0
Nationally scarce	16	2	32
Total		46	109
Species quality score $109/46 = 2.4$			
National Status			
Universal	1	30	30
Widespread	2	14	28
Restricted	4	0	0
Scarce	8	2	16
Total		46	74
Species quality score $74/46 = 1.6$			

CLEPTOPARASITIC LOAD

The cleptoparasitic load (CL) is the percentage of aculeate species that are cleptoparasitic (or parasitoids) on other host aculeates. The CLs for the species of solitary wasps and bees for Gundale and Seckar Moor are given in Table 7. Wcislo (1987) showed that the amount of parasitic behaviour among the aculeate Hymenoptera correlated with geographical latitude, being higher in the temperate, compared with the tropical, regions. As such, CLs for sites in Britain should have similar values.

TABLE 7  
 The relative frequency of the cleptoparasitic (or parasitoid) species among the solitary species recorded from Gundale (G) and Seckar Moor with Woolley Edge Quarry (SW).

	No hosts (H)		No cleptoparasites (C)		Cleptoparasitic Load CL = 100 x C/(H+C)	
	G	SW	G	SW	G	SW
Solitary wasps	21	10	7	0	25.0	0.0
Solitary bees	25	22	11	14	30.6	38.9

For Watsonian Yorkshire the CLs for species of solitary wasps vary from 10.3%-20.5% (range 10.2%). The CL for Gundale at 25.0% slightly extends the range to 14.7%. At Seckar Moor very few species of solitary wasps, and no cleptoparasitic species were found. The relative lack of species of solitary wasps could be a consequence of unfavourable weather conditions when host populations were too small for cleptoparasitic populations to survive.

For Watsonian Yorkshire the CLs for species of solitary bees vary from 25.5%-36.6% (range 10.8%). The CL for Gundale falls within this range and the CL for Seckar Moor at 38.9% slightly extends this range to 13.8%.

AERIAL NESTER FREQUENCY

The aerial-nester frequency (AF) is the percentage of host aculeate species that have aerial nest sites. Aerial nesters mainly use old beetle burrows in dead wood and central stem cavities such as dead bramble. Subterranean nesters nest in the soil, usually in burrows dug by themselves, but sometimes holes and crevices are used after being altered. The AFs for Gundale and Seckar Moor are given in Table 8.

TABLE 8  
 The nesting habits of the host solitary species recorded from Gundale (G) and Seckar Moor with Woolley Edge Quarry (SW).

	No aerial nesters (A)		No subterranean nesters (S)		Aerial nester frequency AF = 100 x A/(A+S)	
	G	SW	G	SW	G	SW
Solitary wasps	6	5	15	5	28.6	50.0
Solitary bees	2	2	23	20	8.0	9.1

The AFs for the solitary wasps in Watsonian Yorkshire vary from 0.0%-84.4% and for the British species is 46.2%: the AF for Gundale is below average and for Seckar Moor just above average. The AFs for the solitary bees in Watsonian Yorkshire vary from 6.7%-30.8% and for the British species is 17.9%: the AFs for Gundale and Seckar Moor are below average.

The above-average AF for the solitary wasps from Seckar Moor contrasts with the other lower AFs. Why should this be so? It is known that the summer abundance of solitary wasps is more sensitive to summer weather conditions than the summer abundance of solitary bees, and that for solitary wasps aerial nester frequency increases along a decreasing warmth gradient (Archer, 1999). Thus the relative high AF for the solitary wasps from Seckar Moor could be a consequence of more unfavourable weather conditions – a speculation that matches the CL information.

#### CONCLUSIONS

1. In terms of the number of aculeate species Gundale is a very good site, Caydale a good site and Brimham Rocks and Seckar Moor with Woolley Edge Quarry promising sites.
2. Estimates of the potential number of species present on a site indicate that Brimham Rocks should receive more recording effort and that the recording effort at Caydale could be extended over a greater area.
3. A species-area investigation indicates that Gundale, Seckar Moor (excluding Woolley Edge Quarry) and probably Caydale are less favourable sites for aculeates because of the altitude effect. Seckar Moor with Woolley Edge Quarry seem to be particularly unfavourable for species of solitary wasps.
4. National rare or scarce species and Yorkshire rare species have been recorded from all four sites.

#### ACKNOWLEDGEMENTS

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## APPENDIX

The list of species of aculeate wasps and bees recorded from Brimham Rocks (B), Caydale (C), Gundale (G) and Seckar Moor with Woolley Edge Quarry (S)

- Chrysididae. *Chrysis angustula* Schenck (C), *C. ignita* (Linn.) (C,G), *C. impressa* Schenck (C,G), *Trichrysis cyanea* (Linn.) (C,G).
- Mutillidae. *Myrmosa atra* Panzer (G).
- Sapygidae. *Sapyga clavicornis* (Linn.) (C,G).
- Pompilidae. *Dipogon variegatus* (Linn.) (B), *Priocnemis parvula* Dahlbom (B), *P. schoedtei* Haupt (C,G), *P. perturbator* (Harris) (C,G), *P. susterai* Haupt (G), *Arachnospila anceps* (Wesmael) (B,C,G,S), *A. spissa* (Schiodte) (B,C,G), *Evagetes crassicornis* (Shuchard) (B,G), *Anoplius nigerrimus* (Scopoli) (C,G).
- Eumenidae. *Odynerus spinipes* (Linn.) (G), *Ancistrocerus oviventris* (Wesmael) (C), *A. parietinus* (Linn.) (S), *Symmorphus bifasciatus* (Linn.) (=mutinensis) (C,G,S), *S. gracilis* (Brullé) (C,S).
- Vespididae. *Dolichovespula norwegica* (Fab.) (B,C,G), *D. sylvestris* (Scopoli) (B,C,G,S), *Vespula austriaca* Panzer (C,G) *V. rufa* (Linn.) (B,C,G,S), *V. vulgaris* (Linn.) (B,C,G,S).
- Sphecidae. *Tachysphex pompiliformis* (Panzer) (S), *Trypoxylon attenuatum* Smith (C,G), *T. clavicrum* Lepeletier (C), *T. figulus* (Linn.) (C,G), *Crabro cribrarius* (Linn.) (G), *Crossocerus elongatulus* (Vander Linden) (B,C,G), *C. ovalis* Lepeletier & Brullé (G), *C. pusillus* Lepeletier & Brullé (B,G,S), *C. tarsatus* (Shuckard) (B,G,S), *C. annulipes* (Lepeletier & Brullé) (C), *C. capitosus* (Shuckard) (S), *C. megacephalus* (Rossius) (C), *C. nigritus* Lepeletier & Brullé (G), *C. podagricus* (Vander Linden) (C), *C. quadrimaculatus* (Fab.) (B), *C. dimidiatus*. (Fab.) (B,G), *Ectemnius lapidarius* (Panzer) (B,C), *E. continuus* (Fab.) (C), *Lindenius albilabris* (Fab.) (S), *Rhopalum clavipes* (Linn.) (S), *Psen dahlbomi* (Wesmael) (C), *P. equestris* (Fab.) (B,G), *Pemphredon lugubris* (Fab.) (B), *P. inornata* Say (C), *Passaloecus singularis* Dahlbom (C), *Mellinus arvensis* (Linn.) (C,G), *Nysson spinosus* (Forster) (G), *Gorytes tumidus* (Panzer) (G), *Argogorytes mystaceus* (Linn.) (B,G).
- Colletidae. *Colletes succinctus* (Linn.) (B,C,S), *Hylaeus communis* Nylander (G), *H. confusus* Nylander (C,G), *H. brevicornis* Nylander (S), *H. hyalinatus* Smith (C).
- Andrenidae. *Andrena clarkella* (Kirby) (B,G,S), *A. fucata* Smith (B,C,G,S), *A. fulva* (Müller in Allioni) (S), *A. lapponica* Zetterstedt (B,G,S), *A. scotica* Perkins (B,C,G,S), *A. bicolor* Fab. (C), *A. ruficornis* Nylander (G), *A. angustior* (Kirby) (B,S), *A. cineraria* (Linn.) (B,G,S), *A. nigroaenea* (Kirby) (C,S), *A. fuscipes* (Kirby) (B,S), *A. haemorrhoea* (Fab.) (B,C,G,S), *A. tarsata* Nylander (C,G,S), *A. barbilabris* (Kirby) (B,G), *A. chrysoseles* (Kirby) (C,G,S), *A. saundersella* Perkins (C,G), *A. subopaca* Nylander (B,C,G), *A. ocreata* (Christ) (G), *A. wilkella* (Kirby) (S).
- Haliictidae. *Haliictus rubicundus* (Christ) (B,C,G,S), *H. tumulorum* (Linn.) (C,G,S), *Lasioglossum albipes* (Fab.) (C,G,S), *L. calceatum* (Scopoli) (B,C,G,S), *L. fraiellum* (Pérez) (B,C,G,S), *L. fulvicorne* (Kirby) (C,G), *L. rufitarse* (Zetterstedt) (B,C,G,S),

- L. cupromicans* (Pérez) (B,C,G), *L. leucopum* (Kirby) (B,G), *Sphecodes crassus* Thomson (S), *S. goffrellus* (Kirby) (=fasciatus) (B,C,G,S), *S. gibbus* (Linn.) (B,C,G,S), *S. hyalinatus* von Hagens (B,C,G,S), *S. monilicornis* (Kirby) (B,S), *S. pellucidus* Smith (G,S).
- Megachilidae. *Chelostoma florissomme* (Linn.) (C), *Megachile willughbiella* (Kirby) (C), *M. circumcincta* (Kirby) (G).
- Anthophoridae. *Nomada fabriciana* (Linn.) (B,G,S), *N. flavoguttata* (Kirby) (C,G), *N. goodeniana* (Kirby) (S), *N. lathburiana* (Kirby) (B,G,S), *N. leucophthalma* (Kirby) (G,S), *N. marshamella* (Kirby) (B,C,G,S), *N. panzeri* Lepeletier (B,C,G,S), *N. ruficornis* (Linn.) (G), *N. rufipes* Fab. (B,S), *Epeolus cruciger* (Panzer) (S), *Anthophora furcata* (Panzer) (S).
- Apidae. *Bombus lucorum* (Linn.) (B,C,G,S), *B. magnus* Vogt (B,C), *B. terrestris* (Linn.) (B,C,G,S), *B. lapidarius* (Linn.) (B,C,G,S), *B. jonellus* (Kirby) (B,G), *B. monticola* Smith (B,C), *B. pratorum* (Linn.) (B,C,G,S), *B. hortorum* (Linn.) (B,C,G,S), *B. pascuorum* (Scopoli) (B,C,G,S), *Psithyrus bohemicus* (Seidl) (B,C,G,S), *P. campestris* (Panzer) (B,S), *P. sylvestris* Lepeletier (B,C,G), *P. vestalis* (Geoffroy in Fourcroy) (G), *Apis mellifera* Linn. (B,C,G,S).

## RECORDER'S SEVENTH REPORT OF THE ACULEATE HYMENOPTERA IN WATSONIAN YORKSHIRE

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Since my last report (Archer, 1997) five new species have been found in Watsonian Yorkshire. In the following account, collectors are identified by the initials: M. E. Archer (MEA), L. Auckland (LA), J. D. Coldwell (JDC), R. Crossley (RC), H. Frost (HF), P. Kendall (PK), C. W. Plant (CWP) and S. M. Saxton (SMS). The new species are: *Prionemis cordivalvata* Haupt, Howell Wood (SE40), JDC, July 1997. *Dolichovespula saxonica* (Fab.), Beningbrough Hall (SE55), MEA, Aug. 1999. *Philanthus triangulum* (Fab.), Pollington Quarry (SE62), PK, July 1997; Lady Spring Wood, Malton (SE77), RC, Aug. 1997. *Sphecodes reticulatus* Thomson, Pollington Quarry (SE62), MEA, June 1999. *Hopliis spinulosa* (Kirby), Burdale (SE86), MEA, Aug. 1998, Aug. 1999.

Other important records are: *Omalus aeneus* (Fab.), Langsett (SE10), JDC, Aug. 1997. *Mutilla europaea* Linn. Biller Howe, North York Moor (NZ90), LA, Aug. 1997. *Eumenes papillarius* (Christ), York Cemetery (SE65), MEA, July 1999, vagrant, second British record. *Vespa crabro* Linn. Winstead (TA22), HF, Oct. 1997, queen seeking overwintering site; Brodsworth Hall (SE50), May 1999, overwintering queen. *Crossocerus binotatus* Lepeletier & Brullé, Wombwell Ings (SE40), JDC, June 1997; Stutton (SE44), MEA, July 1998. *Ectemnius sexcinctus* (Fab.), Lindrick Common (SK58), MEA, July 1997. *Pemphredon morio* (Vander Linden), Beningbrough (SE55), MEA, Aug. 1997. *Argogorytes fargei* (Shuckard), Reighton cliffs (TA17), MEA, June 1997; Fulford Ings (SE64), MEA, June 1998, July 1999; Helmsley Castle (SE68), MEA, July 1998. *Nysson trimaculatus* (Rossius), Thornton Ellers (SE74), MEA, July 1997; Lindrick Dale Quarry (SK58), MEA, July 1999. *Hylaeus signatus* (Panzer), Thorne Moor (SE71), CWP, Aug. 1995; York Cemetery (SE65), MEA, July 1998; Monk Bretton Priory (SE30), MEA, July 1999. *Colletes halophilus* Verhoeff, Welwick saltmarsh (TA31), MEA, Aug. 1999. *Andrena humilis* Imhoff, Holmehouse Wood (SE04), SMS, July 1995; Pollington Quarry (SE62), MEA, May 1998, June 1999; Sandall Beat Wood (SE60), MEA, June 1998. *A. ovatula* (Kirby), Pollington Quarry (SE62), MEA, April 1998, July 1998, May 1999. *A. tibialis* (Kirby), Pollington Quarry (SE62), MEA, April 1999; Sandall Beat Wood (SE60), MEA,