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ORNITHOLOGICAL TOPONYMS IN GOZO – Some observations

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Gozitan toponymy includes several ornithological terms. These comprise hillocks, vallyes, caves, springs, headlands, as well as some rocks and other spots on the coast.

Besides other social, cultural, historical, geographical and general information these place-names provide material for some interesting linguistic observations. Sometimes the study and analysis of these is not possible or is incomplete from an observation of their present established form as a living lexical term only. Map and document can help to back up otherwise doubtful conjectures.

The general pattern of the place-names is definite article + noun + possessive preposition + definite article + noun as in *Il-Ponta Ta' l-Aghsafar* literally 'the headland of the birds'. (The complete assimilation of the definite article *l-* 'the' with the sounds *ċ, d, n, r, s, t, x, z* or *ż* when the following noun starts with any one of the letters, a phonetic phenomenon of the Maltese language and grammar, takes place also in the place-names; cfr. *Taċ-Ċawla* for *ta'* + *l-ċawla* in *Il-Wied Taċ-Ċawla* 'the valley frequented by the jackdaw'.)

Several place-names lack the initial definite article and the preposition *ta'* 'of' in the middle. The name pattern becomes noun + definite article + noun. This renders the meaning of the construct state; the definite article helps to build the genitival relation between the two nouns; cfr. *Wied Il-Merill*, literally 'valley the blue rock thrush'. Still, the general idea expressed by the term is similar to that of the former pattern, 'the valley of the blue rock thrush'. In both cases the actual name-word for the place precedes that of the bird. In many cases the actual place descriptive has dropped out of the phrasal place-name combination. The bird's name, preceded by the agglomeration of the preposition and the definite article, by itself has acquired the value of a place-name, cfr. *Taċ-Ċawla* and *Tal-Gruwa* for 'the place frequented by' or 'the nesting place of' the 'jackdaw' and the 'common crane' respectively.

The vocabulary of the Maltese language is made up of an admixture of Semitic (S) and Romance (R) stock. This is also reflected in the place-names. The harmonious combination of both elements may also be encountered in ornithological toponyms, as in *Il-Ponta* (R) *Ta' L-Aghsafar* (S) and in *Il-Wied (S) Taċ-Ċawla (R).* No Teutonic vocable is however present in either of the place name-words or those of the bird species, evidence,

perhaps, that the onomastic terms were all established or at least had taken shape before the British rule.

The geographical situation and climatic conditions of the Maltese islands offer favourable half-way resting places for many migratory birds. Some even stay on to nest with the twenty or so resident species. This explains the gradual association between places and species and the resulting coinage of the ornithological toponyms such as *Ta' Hida* in Nadur, Gozo.

Hida is archaic Maltese for 'red kite', today more popularly known as *astun* (although the Romance word was originally astur [1]). *Hida* is Semitic, a fossilized part of our past. We may further infer that the place-name was coined during the Arab rule over the islands (870 — 1223 A.D., when all remaining Arabs were expelled by Fredrick II).

Like any other common name, *ħida* could have been the nickname of the landowner who eventually gave his name to the land he owned. *Gardill* 'goldfinch' (Xewkija), *ċevett* (a dialectal variant of *ċuvett*) 'poolsnipe' or 'redshank' (Rabat) and *merill* 'blue rock thrush' (Sannat) are existent Gozitan nicknames. However, documented information suggests that *ħida* in the place-name did not originate from a nickname.

The names of some species have stuck to places or spots where the birds may still be seen frequenting or perching; cfr. *Il-Blata Tal-Gawwi* 'the rock frequented by the seagulls'. *Il-Ponta Ta' l-Aghsafar* literally 'the headland of the birds', beneath Fort Chambray in Mġarr, is an area that still serves as the dwelling place of many home sparrows. However, *Il-Ġebla Taċ-Ċawl* 'the jackdaws' rock' off Ħondoq Ir-Rummien beneath Qala, no longer serves as a resting place for the jackdaws since the species became locally extinct.

Ta' Ħida

Ta' Hida must have been one of the places frequented or inhabited by the red kite. Most probably it served as a nesting place for the species.

De Soldanis (1712 — 1770) records the names *Il-Ġnien Ta' Għoxx Il-Hida* [2] and *L-Għajn Ta' Għoxx Il-Hida* [3] both in Nadur, Gozo. *Ġnien* [4] is the Maltese word for 'garden' and *għajn* for 'spring' (although it also means

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1. E. Serracino Inglott, *Il-Miklem Malti* (Malta, 1975 —), Vol. I under *astur*. In the more popular *astun* the finla 'n' is a phonetic mix-up with 'r', another of the liquid consonants.
2. "...giardino *ta Hosc el Hida*, parola araba che significa milvo, uccello di rapina..." N(ational) L(ibrary of) M(alta), Libr(ary) MS 145a, p. 357.
3. "...*ta Hosc el Hida*, che significa nido del milvo..." *Ibid.*, p. 13. The word *għajn* is not included in the phrasal place-name because De Soldanis had already given it at the top of the list of springs found in Nadur.
4. "This word presumably indicated an area, often closed and irrigated, devoted to fruit and vegetables, much like the Valencian *huerta*..." H. Bresc, "The Secretia

'eye'). Besides *ħida*, the other word common in both phrasal place-names is *għoxx* which today means 'female pudenda'.

This word is of Arabic origin, where it still means 'nest'. *Għoxx Il-Hida* in both place-names recorded by De Soldanis actually meant 'the nest of the red kite'. The fact that this was not the only nesting place of the species is evidenced by the documentation of two other similar but extinct place-names, one in Siggiewi, [5] the other in St. Paul's Bay, [6] both in Malta, proving that the word *għoxx* used to mean 'nest' also in Maltese. This is further witnessed by the presence of the word with similar sense in several other documented but extinct place-names such as *Għoxx Il-Agħrab* [7] 'the raven's nest' in Gozo, *Għoxx Il-Hamiema* [8] 'the pigeon's nest' in Malta and *Għoxx In-Naħal* [9] 'the bees' nest' (today simply known as *Tan-Naħla*) in the limits of Marsalforn, Gozo. Naturally, once *għoxx* acquired its vulgar connotation, it was eventually replaced by the word *bejta* in the spoken language and lost its place in the toponymic terms.

Agħrab

Agħrab mentioned above, and its variant *għorab*, [10] is of Semitic origin. The bird it used to define is today known by the Romance names *korvu, ċawlun* or *ċawla imperjali*, [11] *Corvus frugilegus*.

In both *agħrab* and *għorab* the natural stress or tonic accent falls on the second vowel "a". In each case the first vowel happens to be the euphonic or prosthetic vowel. The only difference between the pronounciation of *agħrab* for 'raven' and *Għarab* for 'Arabs' lies in the placing of the stress, which is laid on the first vowel in the latter word. There is however

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and the Royal Patrimony" in *Medieval Malta* ed. A. T. Luttrell, (London, 1975), p.129.

5. "Id-Dukkiena ta' Bonan, Bonan's stone bench, 1467, name of a strip of land in the district of *Ghux il-Hida*, near Siggiewi." G. Wettinger, "Some Maltese Medieval Place-Names of Archaeological Interest" in *Atti del Colloquio Internazionale di Archeologia Medievale* (Palermo, 1976), p. 25.
6. *"Vyed Oosc el Hida,* Valle, nido del milvo." G. F. Abela, *Della Descrittione di Malta, Isola del Mare Siciliano e Adriatico con le sue Antichità ed altre Notizie* (Malta, 1647), p. 72.
7. E. Serracino Inglott, *op. cit.*, under *agħrab*. The lexicographer does not cite the source and yet locates the name as pertaining to a cave found between *Ras In-Newwiela* and *Mġarr Ix-Xini*, Gozo. There are no caves in the area and De Soldanis himself gives just *għosc el ħrap*, cfr. NLM, Lib. MS 145a, p.25.
8. *"Guardia Oosc el Hamiema,* cioè nido della colomba." G. F. Abela, *op. cit.*, p. 27.
9. *"...ta mersuch* alias *hosc e nachal* in contrata *marsa el furni..."* NLM, Archives of the Order of Malta, MS 1991, p. 83.
10. G. Aquilina, *Papers in Maltese Linguistics* (Malta, 1961), p. 220. Cfr. *għoroba* in n. 13. *infra*.
11. E. Serracino Inglott, *op. cit.*, under *agħrab*.

another important difference. If the former word was ever in use in the Maltese language, as it most probably was, it is extinct today, save for its possible incidental survival in the following toponyms; — *Ta (sic) Għarab* (limits of Munxar), [12] *Wied Il-Għarab* (limits of Munxar) and *Tal-Għoroba* (limits of Xlendi). [13] The last term is surely the dialectal phonetic transcription of the plural form of *għorab*. The other two may have a trace of *agħrab* for 'raven'.

Għarab in *Ta Għarab* as printed on the Survey Sheets of Gozo [14] and in *Wied Il-Għarab* as pronounced for me by a villager from Munxar, seems to be the plural form of *Għarbi/Għarbija* 'an Arab man/woman' hence 'Arabs'. The Gozitans give a folk interpretation to the origin of the latter place-name, namely that of North African corsairs (more generally called *Torok* 'Turks', rather than *Għarab* 'Arabs') having once attacked and tried to carry into slavery a Gozitan female baker who had her bakery in the vicinity. *Il-Wied Ta' L-Għawdxija* 'the valley of the Gozitan (woman)' is still the name of a valley in the vicinity.

I believe that in these last two cases, *Għarab* was confused with *agħrab* for 'raven', once the latter word went out of use. The place-names should read *Ta' L-Agħrab* 'the place frequented by the raven', and *Wied Il-Agħrab* 'the valley frequented by the raven'. Both places might have had some connection with *Għoxx Il-Agħrab* mentioned earlier and might have served as nesting-places of the species. Both might have had *għoxx* included, in which case cp. *Wadi Għoxx El Għurab* 'the valley of the raven's nest' in Western Palestine. [15]

G. F. Abela (1582 — 1655) records the place-name *"Vued el Aarab"* (in Gozo) and explains it as "valle de gli arabi" [16] 'valley of the Arabs'. The exact locality is not given.

In his history of Gozo, [17] De Soldanis cites *Għoxx Il-Ħrab* (in the limits of Ta' Ċenċ cliffs, again in the limits of Sannat) and explains it as "nido

12. P(ublic) W(orks) D(epartment), Survey Sheets of Gozo, (Malta, 1968), Ref(erence) 3087.
13. *Ibid.*, Ref. 2888.
14. *v.* n. 12 *supra.*
15. G. Aquilina, *op. cit.*, p. 220.
16. G. F. Abela, *op. cit.*, p. 121.
17. *Il Gozo Antico — Moderno, Sacro — Profano,* NLM, MSS 145 and 145a. The first is a neat copy of the second. This is an unpublished XVIII century history of Gozo, written in Italian. It was translated into Maltese by Dun (later Monsignor) Ġużepp Farrugia, a Gozitan, and published and printed by the Government Printing Press as *Għawdex bil-Ġrajja Tiegħu* (Malta, Vol. I 1938, Vol. II 1953). Some place-names are given inaccurately in the translation which was made on a perfect copy of De Soldanis' work, made by Michaelangelo Garroni, the first librarian of the Gozo Public Library; cfr. *Rdum Fiddien* in the translation, Vol. I, p.26, for *Rdum Firdien* in NLM, MS 145a, p. 18.

dei corvi" [18] 'ravens' nest'. *Hrab* is in fact the euphonic transcription of *Għrab* which, in turn, is *agħrab* or *għorab* without the euphonic vowel. Because the *għ* is being sounded (something like an "ħ" in the case of De Soladnis) it would need no such "help".

De Soldanis never writes *agħrab* or *għorab* in either of his history of Gozo or his dictionary. [19] In Vol. II he explains "corvo" as "l. corvus: *Ghrap* (*sic*)" and in Vol. I explains *Ghrap* as "... corvo, uccello di rapina l. corvus". [20] This indicates either that De Soldanis copied from Abela who writes "*Aayn Ghrab*, Fontana del corvo" [21] or that he himself heard the name-word pronounced as such.

The inhabitants of Għarb, Għasri, Sannat and Munxar, all in Gozo, still distinguish between the pronounciation of the pharyngal fricative "*għ*" and the velar fricative "*għ*" in many cases. In these villages one may still hear *bagħal* 'mule', *għalqa* 'field' and *mgħarfa* 'spoon' with the "*għ*" radical sounded "... like the French 'r' *grasséyé* with a little more of the g in it." [22] In Maltese it is a remnant of Classical Arabic once possibly spoken on our islands and remains of which seem to be still existing in the spoken language of the people of the villages mentioned. In that case *għrab* would be sounded something like *ħrab* with a harsh *ħ* and would need no euphonic vowel.

The fate of *ħida* and *għrab* (or *agħrab*) in the Maltese language must have befallen many other words. The process of new lexical terms replacing older ones is in fact still going on and although we still know what *qorq* (S) and *moxt* (S) are, *sandli* (R) and *pettne* (R) are rapidly replacing them as words for 'sandals' and 'comb' respectively. This is in fact one of the signs of a healthy living language.

Nigret

The word *nigret* must have once been more diffused in Maltese. *In-Nigret* (singular form) and *L-Ingieret* (plural) (both sometimes spelled with an "m" instead of an "n") are two well known toponyms in Malta.

In their dictionaries both A. E. Caruana [23] and D.G. Barbera [24] reproduce *nigret* with a final "d". None of them contested this consonant reproduced

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18. *v.* n. 7 *supra*. De Soldanis translates "corvi" ('ravens') *għrap* (for *għrab*) which is in the singular. The plural form would have been *għraba*.
19. *Damma tal' Kliem Kartaginis Mscerred fel Fom tal Maltin u Ghaucin*, NLM, Libr. MS 143, four Vols. Although De Soldanis mentions that there existed other Maltese distionaries before his (which remained unpublished), none seem to have survived *Damma...* is held to be the first Maltese dictionary.
20. *Ibid.*, Vol. I, under *Għrab*.
21. G. F. Abela, *op. cit.*, p. 66.
22. J. A. Haywood and H. M. Nahmed, *A New Arabic Grammar* (London, 1970), p. 7.
23. A.E. Caruana, *Vocabolario della Lingua Maltese* (Malta, 1903).
24. D.G. Barbera, *Dizionario Maltese, Arabo, Italiano* (Beyruth, 1940), four Vols.

as such by M.A. Vassalli in 1796.[25] This is perhaps because the "t" is the unvoiced complement of the voiced dental plosive "d" which is unvoiced when it forms part of a consonantal junction with an unvoiced consonant (cp. *ħadt* 'I took' which is sounded *ħatt*) or when at the end of a word (cp. *raqad* 'he slept' and *qabad* 'he caught' which are sounded *raqat* and *qabat* respectively).

G. B. Falzon repeats Vassalli's information and just defines "... the name of an ancient village in Malta,"[26] and omits the word in his second edition of 1882.[27] Caruana explains "voce di significato ignoto, ..."[28] 'word of unknown meaning'. Barbera, on the other hand, concludes that the nearest etymology of the word is traceable to Arabic roots *n-għ-r* agglomerated to the *t marbuta* still used in the construct state in Maltese. He derives this from Dozy-Supplement[29] and explains the word as "... cornacchia (corvus Pica di Linneo), ..."[30]

Now "cornacchia" is defined as "... uccello della specie del corvo imperiale, un po' piu' piccolo e con penne azzurrognole (nap. cola, ciaula)."[31] This is corroborated by the same Barbera when explaining the word *cawl* (for *ċawl*) as "... cornacchia, ... Corvus Corone o Pica — L. ..."[32]

The word *ċawla* 'jackdaw' must have come into Maltese from Neapolitan, most probably through Sicilian. Since the new word established itself in the spoken language it also started to replace *nigret*, which gradually became obsolete and eventually lost currency also in the place-names. Many, if not all, of the contemporary place-names including *ċawla* or *ċawl* as a composite part thereof, may have once had *nigret* or *ingieret* instead.

Ċawla and *ċawl* are tied to several place-names in both Malta and Gozo. Places associated with the bird's name in Gozo are found in the limits of Rabat — *Taċ-Ċawla*; Ras Ir-Reqqa — *Taċ-Ċawla, Il-Wied Taċ-Ċawla* (a valley) and Mġarr (harbour) — *Il-Ġebla* or *Il-Blata Taċ-Ċawl* (printed *Taċ-Ċawl Rock* on the latest contour map of Gozo).[33]

L-Ingieret is the name of a stretch of land in the same area called *Taċ-Ċawla* in the limits of Ras Ir-Reqqa, on the outskirts of Għarb.

Documented information associates *Taċ-Ċawla* in Rabat with *nigret* at an earlier date. A stretch of land in the same area and established as a

25. M.A. Vassalli, *Lexicon Melitense-Latino-Italum* (Romae, 1796), under *nigred.*
26. G.B. Falzon, *Dizionario Maltese-Italiano-Inglese* (Malta, 1845), under *nigred.*
27. G.B. Falzon, *Dizionario Maltese-Italiano-Inglese* (Vol. I, Malta, 1882).
28. A.E. Caruana, *op. cit.*, under *nigred.*
29. R. Dozy, *Supplément aux Dictionaires Arabes* (Leide, 1927).
30. D.G. Barbera, *op. cit.*, Vol. III, under *nigred.*
31. N. Zingarelli, *Vocabolario della Lingua Italiana* (2nd ed.; Greco-Milanese, 1922), under *cornacchia.*
32. D. G. Barbera, *op. cit.*, Vol. I, under *caul.*
33. MALTA, Map Series M898, Sheet 1, Edition 1 D.O.S. published by D. Survey, War Office and Air Ministry, 1962.

benefice in 1579 was described thus: "... *ta nigret* in qta. di S. Francesco alias *ta ciaula*, seu ta *Hain Cathet* ..." [34] Another benefice in the district of Għarb was called *Habel Tan-Nigret.* [35] This may have been found in the same area today still called *L-Ingieret* mentioned above. Some other place-names featuring *nigret* and *ingieret* and tied up to benefices in Gozo are "... San Cataldo or *Habel In-Nigret* ...", [36] *"In-Nigret Ta' Salvuzzu"* [37] and "... *ta ciaula* seu *ta nigret* ..." [38] This last name confirms that there was a time when the stretch of land was called by either of the names *ċawla* or *nigret.*

In the meantime the jackdaw disappeared completely from our islands and its name's occurence in place-names is the only living proof that it once actually dwelt among us.

Il-Kanġu ta' Filfla

Another bird with a fate almost similar to that of the jackdaw is the storm petrel, in Maltese called *kanġu ta' Filfla,* where *kanġu* is the actual name of the bird and *Filfla* that of the "... crumbling rock of ... (an island which) ... provides the ideal habitat during the breeding season for our sea-birds — namely, the yellow-legged Herring gull, the Cory's and Manx shearwaters and the Storm petrel," [39] and which lies about three kilometres out at sea south-west of Wied Iż-Żurrieq (Malta). The bird is so called because it is not seen anywhere else on the islands. Once, however, it lived and nested in other areas too, and must have been simply called *kanġu.*

About two and a half centuries ago this foul-smelling bird nested and lived in great numbers in a cave in Ta' Ċenċ cliffs in Gozo.

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34. NLM, Libr. MS Ad. 73, p. 997. This benefice was founded by Don Lorenzo de Apapis as may be seen in the notarial deeds of Not. Tomaso Gauci and recorded on 9 May 1579.
35. "Giuspadronato denominato *chabel ta nigret* in contrada del Garbo." NLM, Libr., MS Ad. 73, p. 436.
36. V. Borg, *The Seminary of Malta and the Ecclesiastical Benefices of the Maltese Islands* (Malta, 1964), p. 51. This benefice was founded by Simon Caxaro on the 18 June 1588. Most probably the district called *Habel In-Nigret* here and that called *Habel tan-Nigret* in the previous n.35 are the same.
37. "Giuspto. *ta iccinus* seu *il nigret ta salvuzzu* in qta. *ta hain xeiba*" (Xagħra). NLM, Libr. MS Ad. 73, p. 911.
38. "...appta. *ta ciaula* seu *ta nigret*..." This is a benefice founded on 22 February 1580 and shows that at least by this date *ċawla* had already entered into Maltese and started establishing itself in the place-names. NLM, Libr. MS Ad. 73, p. 254.
39. S. Borg, "The Storm Petrel — A Small but Brave Sea-Bird" in the *Times of Malta,* 2 October 1978, p. 5.

> ... *Għar Ilma.* In this cave one may see small sea animals that fly. These live in crevices in the walls of the cave during the day. At night they go out in search of sea-food. Wherever they go they leave a very stinking smell. Some fishermen have assured me that these birds are found in no other cave in either Gozo or Malta. I gave all this information to a certain French knight who, in 1746, came to Gozo to collect some plants and birds from the island for study. He obtained eight specimens of this bird. I saw them both in the nest and when outside. Their size is similar to that of the song thrush, with a black beak resembling that of a pigeon. It has a brownish coloured area near the eyes. Its feet are like those of a duck. For a fortnight the knight fed them fish and eggs. Yet he could not say what species they pertained to. Then he sent some of them for study to a certain renowned scholar, a certain Lomien, in Paris. [40]

The bird described in this paragraph by De Soldanis is today's *kanġu ta' Filfla.* Whether the bird nested on Filfla in the author's days as well is not known. Nor is it known whether it lived only in the cave mentioned as reported by De Soldanis. However, it may be assumed that the species lived and nested somewhere in Ta' Ċenċ cliffs, off Sannat village, most probably in the cave today still known as *Għar Ilma* 'water cave'. Two factors, one toponymic the other linguistic, corroborate this hypothesis.

In Ta' Ċenċ, west of the place called Il-Bardan, near Is-Sanap, close to Ir-Ras 'the headland', there is an area known as *Ta' Kanġu.* This spot is found above the cliffs, beside the fields in Ta' Ċenċ. On the other hand, *Għar Ilma* is found at the foot of the cliffs somewhere beneath the same area. It may be reached only by boat.

Naturally, little do bird lovers, trappers or hunters who frequent the surroundings associate the place-name with that of the bird or imagine the name to be a living remnant of a past when the storm petrel was simply called *kanġu* and used to nest somewhere in the vicinity.

A. E. Caruana defines *kanġu tagħ (sic) Filfla* as "... detto pure per il suo cattivo odore, *bunittien*, "Talisdroma Melitensis", uccello acquatico, che ama di fare il suo nido sull'isoletto di Filfla, donde il suo nome." [41] The same name however appeared for the first time as such in Falzon's Maltese dictionary of 1845. [42]

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40. NLM, Libr. MS 145a, p. 22. The extract reproduced is a liberal translation of the Italian original, cfr. n.17 *supra.*
41. A.E. Caruana, *op. cit.*, under *kangu tagħ Filfla.*
42. G.B. Falzon, *op. cit.*, under *Kangu tagħ Filfla.* Still no one, not even E. Serracino Inglott, *op. cit.*, Vol. I, ever mentions that the word *kanġu* by itself could have ever stood as the name for the bird.

Kanġu then is another name for bunittien. The former is a word of Romance origin, [43] the latter of Semitic, therefore more archaic. It may also be said that, like other archaic covabulary, *bunittien* is a more precise and colourful descriptive of the bird.

The word is made up of two morphological stems, *bu* from Arabic sense 'father' and *nittien* from Arabic radicals *n-t-n* "to stink, emit a strong offensive smell." [44] In Maltese *bu* lost the stem value and acquired that of a prefix. It is found as such in quite a number of Maltese words; cp. *bugħarwien* (made up of *bu+għarwien* literally 'father of the naked') 'slug', *bumunqar* 'weevil' and *buwaħħâl* 'suck-fish' or 'lamprey'. The prefix conveys the meaning of 'father of' or 'paragon'. *Bunittien* is coined on the same pattern of *buwaħħal*, namely *bu+kvkkv:k.*

Nittien is the name of the doer, and is derived from the verb *niten* 'to stink, to putrefy', hence *nittien* stands for 'stinker, putrefier' and the bird described by De Soldanis stunk, because wherever "they go they leave a stinking smell."

The storm petrel must have lived in greater numbers in the Maltese archipelago, and, among other places, it lived and nested in Ta' Ċenċ.

A place-name is "... une forme de langue, un mot formé, comme tous les autres, de voyelles et de consonnes, de phonemes articulés par les organes de la parole et transmis per l'oreille au cerveau." [45] This approach was not however adopted before the XIX century. Still man was always tempted to interpret the meaning and at times the origin of place-names he encountered in his daily striving for a living, cfr. "And they brought him to the place called Golgotha (which means the place of a skull)." (Mk 15. 22).

With regards to a folk interpretation of a Gozitan place-name, I have already mentioned Wied Il-Għarab and Il-Wied Ta' l-Għawdxija. Another example is perhaps more interesting. It is associated with a deep well-like hole in the sea bed off the coast of Dwejra bay on the north west side of Gozo. The hole is close to the picturesque natural window-like fault in the promontory rocks described and called *It-Tieqa* 'the window'

'Hole' in Maltese is *ħofra* and almost every inhabitant from the neighbouring village of San Lawrenz, and many other Gozitans believe that this is the legendary *Il-Ħofra Tal-Bidwin* 'the hole of the farmers *(bidwi* is Maltese

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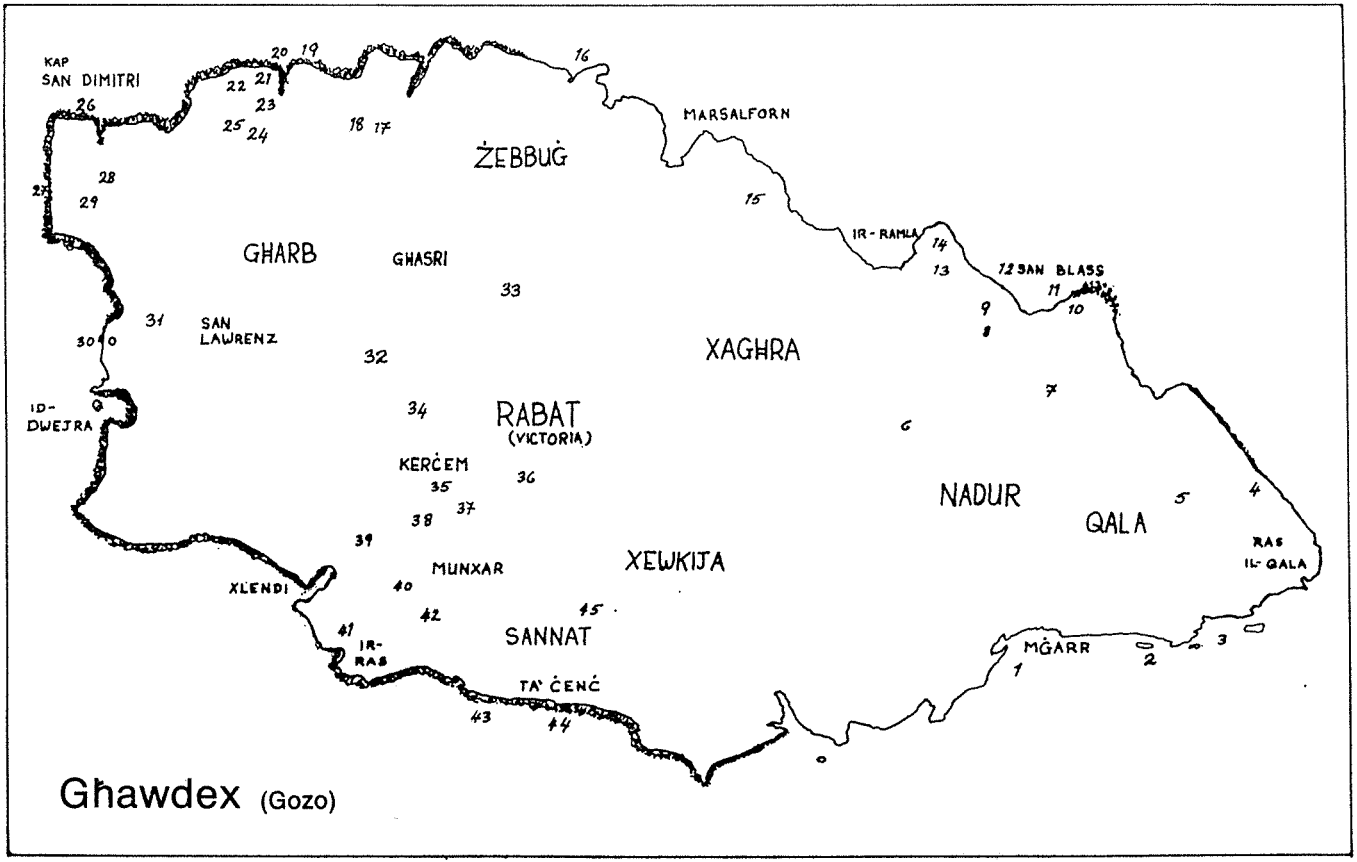
43. D.G. Barbera, *op. cit.*, Vol. II, under *Kangu tagħ Filfla,* derives *kangu* from Italian "cangio, cambio". E. Serracino Inglott, *op. cit.* Vol. V, under *kanġu* shows doubt about this and the real etymology. Yet he suggests a possible trace of old Italian "gangio" for 'hook' perhaps because of the hook-like beak of the bird.
44. Alias A. Elias & Ed. E. Elias, *Elias Modern Dictionary — Arabic — English,* (9th ed.; Cairo, 1972), under *n-t-n.*
45. M. Ernest Muret, *Les Noms de Lieux dans Les Langues Romanes* (Vulaines s/Seine, 1930), as quoted by C. Rostaing, *Les Noms de Lieux* (Paris, 1969), p. 9.

for 'farmer')'. Many people hold that at the bottom of this hole there is a narrow opening through which a diver may pass into the open sea. The legend says that a number of farmers (some say two, others three and others seven), made a bet to see who could swim out of the "well" to the open sea beyond. They all got wedged in the "tunnel" and drowned.

How old and true the legend is may be left to one's imagination, once we find that in the popular call-name there is an unreasonable confusion of an "r" with the "d" in *bidwin*. The proper place-name is therefore *Il-Hofra Tal-Berwin* as actually reproduced on the Survey Sheets of Gozo [46] and in which case it would be translated as 'the hole of the dotterel', another ornithological toponym.

"Place-names arise from, are influenced by and throw light upon the language and speech habits of people." [47] These few notes on some of the ornithological terms in Gozo reflect this.

46. PWD, Survey Sheets of Gozo, Ref. 2689.
47. J.S. Ryan, "The Rationale of Proper Name Study — an extension of the extra-lexical common stock and Toponym Horizon", a paper delivered to the Thirteenth Annual Meeting of the American Name Society on the 29 December 1965, Chicago, Illinois, (mimeograph), p. 16.


KAP
SAN DIMITRI
ŻEBBUĠ
MARSALFORN
IR-RAMLA
SAN BLASS
GHARB
GHASRI
SAN
LAWRENZ
XAGHRA
ID-
DWEJRA
RABAT
(VICTORIA)
KERĊEM
NADUR
QALA
RAS
IL-QALA
MUNXAR
XEWKIJA
XLENDI
IR-
RAS
SANNAT
MĠARR
TA' ĊENĊ
Għawdex (Gozo)

LIST OF BIRDS AND PLACE-NAMES

This is an alphabetical list of the bird names encountered in the toponymy of Gozo. After each name the relative linguistic information and the English and scientific names taken from D. A. Bannerman and J. A. Vella-Gaffiero, *Birds of the Maltese Archipelago* (Malta, 1976), are given. The respective toponyms associated with each of these are included. In this case only the actual place name-word is translated, e.g. *Wied* ('valley') *Il-Merill* since the translation of the bird-name has been given before. The bracketed numbers after each place-name refer to the accompanying map, giving the approximate location in relation to the town and villages and other landmarks in Gozo.

Only the Gozitan ornithological terms are given in the list.

The list, however, includes all the present bird toponyms. Extinct place-names referred to in the article, are marked with an asterisk.

Abbreviations used:

arch.	=	archaic,
col.	=	collective,
f.	=	feminine,
m.	=	masculine,
n.	=	noun,
pl.	=	plural,
R.	=	Romance,
S.	=	Semitic and
s.	=	singular.

AGĦRAB (variants of which are *għorab* and *għrab*), S, arch., (today *korvu* and *ċawlun* or *ċawla imperjali* are used instead); n.s.m., pl +*a*; 'raven', *Corvus frugilegus;*
* *Għoxx* ('nest') *Il-Għrab* (once in Ta' Ċenċ cliffs),
Ta' L-Agħrab (42),
Wied ('valley') *Il-Agħrab* (40) and
Ta' L-Għoroba (39).

ARPA (sometimes written also *alpa*), R; n.f.s., pl. —*i*; 'osprey', *Pandion haliaetus haliaetus;*
L-Għar ('cave') *Ta' L-Arpa* (43).

BARBAĠANNI (very often accepted as being the pl. form of *barbaġann*), R; n.s.m. pl. + *jiet*; 'barn owl', *Tito alba;*
Il-Ġebla ('stone' or 'rock') *Tal-Barbaganni* (3).

BIEŻ (sometimes spelled also *bies*), S; n.s.m., pl. *biżien*; 'mediterranean peregrine', *Falco peregrinus brookie;*
Il-Ħotba ('hillock') *Tal-Bież* (29),

L-Għar ('cave') *Tal-Bież* (27) and
Tal-Bież (28).

BIRWIN (dialectal form of which is *berwin* and sometimes written also *burwin* and *birwiena* — cfr. E. Serracino Inglott, *Il-Miklem...*, Vol. I, under *birwin*), S; n.s.m., f. +*a*, pl. +*t*; 'dotterel', *Eudromias morinellus;*
Il-Hofra ('hole') *Tal-Berwin* (30).

BORKA (dialectal form of which is *birka*), S; n.s.f., pl. *borok* (or *birek*); 'wild duck', *Anas* species;
Tal-Birka (5).

ĊAWL (a word which replaced arch. and S *nigret q.v. infra*), R; col. n.m., n.s.f. +*a*, pl. *ċawliet*; 'jackdaw', *Corvus monedula spermologus;*
Il-Ġebla ('stone' or 'rock') *Taċ-Ċawl* sometimes known also as *Il-Blata* ('rock') *Taċ-Ċawl* (2),
Wied ('valley') *Iċ-Ċawl* (15),
Il-Wied ('valley') *Taċ-Ċawla* (22),
L-Għar ('cave') *Taċ-Ċawla* (21) and
Taċ-Ċawla (23) and (36).

ĊUVETT (De Soldanis gives *civet* and others *ċovet*, cfr. E. Serracino Inglott, *op. cit.* Vol. I, under *ċuvett*), R; col. n.m., n.s.f. +*a*, pl. *ċuvettiet*; 'spotted' or 'dusky redshank', *Tringa erihropus;*
Il-Ħotba ('hillock') *Taċ-Ċivett* (13).

GALLINA R; n.f.s., pl. —*i* and *galliniet*; 'woodcock', *Scolopax rusticola rusticola;*
Il-Wied ('valley') *Tal-Gallina* (18) and
Tal-Gallina (17).

GANGA (sometimes written also *gangа*, cfr. E. Serracino Inglott, *op. cit.*, Vol. III, under *ganga*), R; n.f.s., pl. *gangiet*; 'pintailed sandgrouse', *Pterocles alchate caudacuta;*
Il-Qortin (originally "... dating back to the XVI th century is a military word meaning *opera avanzata di fortificazione*, Fr. 'courtine' " — G. Aquilina, "The Hills of Malta and Gozo" in *Proceedings of the X th International Congress of Onomastic Sciences* (Vienna, 1969), p. 74, but probably from Italian "cortina" 'natural fortification', today more 'descriptive' of "... campi di poca terra ed esposti al vento e pertanto di scarso prodotto." — A. E. Caruana, *Vocabolario...*, under *qortin*) *Tal-Ganga* (8),
Il-Wied ('valley') *Tal-Ganga* (9) and
Is-Sofor ('the yellow' rocks) *Tal-Ganga* (12).

GARDILL R; n.s.m., pl. *griedel*; 'goldfinch', *Carduelis carduelis carduelis;*
Il-Ħotba ('hillock') *Tal-Gardill* (33).

GAWWI (probably brought into Maltese by Arabs from *Ifryqiyah* from Latin "gavia" — Pliny, cfr. G. Aquilina, *Papers...*, p. 48), S; col. n.m., n.f.s. +*ja*, pl. *gawwijiet*; 'seagull', *Laridae* species;

Il-Blata ('rock') *Tal-Gawwi* (11).

GRUWA (in Gozo it is also pronounced *grewwa*, others just *gru* and *grawwa* cfr. E. Serracino Inglott, *Il-Miklem* ..., Vol. III, under *grawwa*; from old Italian "grua"), R; n.f.s., pl. +*t* and *grew*; 'common crane', *Megalornis grus grus*;
Tal-Gruwa (45).

HAMIEM S; col. n.m., n.f.s. +*a*, pl. *ħamimiet*; 'pigeon', *Columbidae* species;
L-Għar ('cave') *Tal-Ħamiem* (26) (once most probably known as *Ħarq* ('crevice') *Ta' L-Għar* ('cave') *Il-Ħamiem* — NLM, Libr. MS 145a, p. 20), also *L-Għar Tal-Ħamiem* (44),
Wied ('valley') *Il-Ħamiem* (14) and
L-Għajn ('spring' or 'water source') *Tal-Ħamimiet* (34).

HIDA S, arch., (today replaced by *astur* or *astun* R); n.f.s., pl. —*t*; 'red kite', *Milvus milvus milvus;*
* *Il-Ġnien* ('garden') *Ta' Għoxx* ('nest') *Il-Ħida,*
* *L-Għajn* ('spring') *Ta' Għoxx* ('nest') *Il-Ħida* and
Ta' Ħida (6).

KALANDRA R; n.f.s., pl. —*i* and *kalandriet*; 'calandra lark', *Melanocorypha calandra calandra*;
Ta' Kalandriet (37) (givin to me also as *kalandrijiet*).

KANĠU R, (a word which replaced S arch. *bunittien*, today actually known as *kanġu ta' Filfla*); n.m.s. pl. +*ijiet*; 'storm petrel', *Hydrobates pelagigus*;
Ta' Kanġu (41).

KOKKA R; n.f.s., pl. *kokkiet* and *kokok*; 'scops owl', *Otus scops scops*;
Tal-Kokka (7).

KWAKK R; n.m.s. and col., n.f.s. +*a*, pl. +*i*; 'night heron', *Nycticorax nycticorax nycticorax*;
Il-Ġebla ('stone' or 'rock') *Tal-Kwakki* (16).

MALVIZZ R; n.m.s., pl. *mlievez*; 'song thrush', *Turdus ericetorum philomelus;*
Ta' L-Imlievez (35).

MARGUN R; n.m.s. and col.; 'asiatic cormorant', *Phalacrocorax carbo sinensis*;
Il-Fonda ('deep' hole) *Tal-Margun* (20) and
L-Għar ('cave') *Tal-Margun* (19).

MERILL R; n.m.s. and col; 'blue rock thrush', *Monticola solitaria*;
Wied ('valley') *Il-Merill* (31).

MILON R, (encountered only in the following place-name); n.m.s.; (traceable to French "milan" for arch. *ħida q.v. supra* and associated as such by Dozy-Suppl., cfr. E. Serracino Inglott, *op. cit.*, Vol. IV, under *ħida*);

Il-Borġ (once originally 'tower' but today more descriptive of a 'heap') *Tal-Milon* (10). The place so called is in the limits called *Ta' Hida q.v. supra*) in Nadur.

MINKELLA R; n.f.s.; 'little ringed plover', *Charadrius dubius coronicus*; *Ta' Minkella* (38).

NIGRET S, arch. (today replaced by *ċawl q.v. supra*); n.m.s., pl. *ingieret*; * *Habel* (a land measurement) *In-Nigret*, sometimes referred to also as *Habel tan-Nigret* or simply as *Tan-Nigret* (once in the limits of Għarb), * *In-Nigret Ta' Salvuzzu* (owner's name) (once in the limits of Għajn Xejba still existing in Xagħra),
* *Tan-Nigret* (once in Rabat, today known as *Taċ-Ċawla*),
Il-Hotba ('hillock') *Ta' L-Ingieret* (25) and
L-Ingieret (24).

SEQER S; n.m.s., pl. *isqra*; 'hobby', *Falco subbuteo subbuteo*;
Tas-Seqer (32).

VENEW (from Latin *vanellus* ? R); col. n.m.s., n.f.s. +*wa*, pl. also *venew-wiet*; 'lapwing', *Vanellus vanellus vanellus*;
L-Għajn ('sprin') *Tal-Venew* (4).

GHASFUR S; n.m.s. n.f.s. +*a*, pl. *agħsafar*; 'bird';
Il-Ponta ('headland') *Ta' L-Agħsafar* (1).

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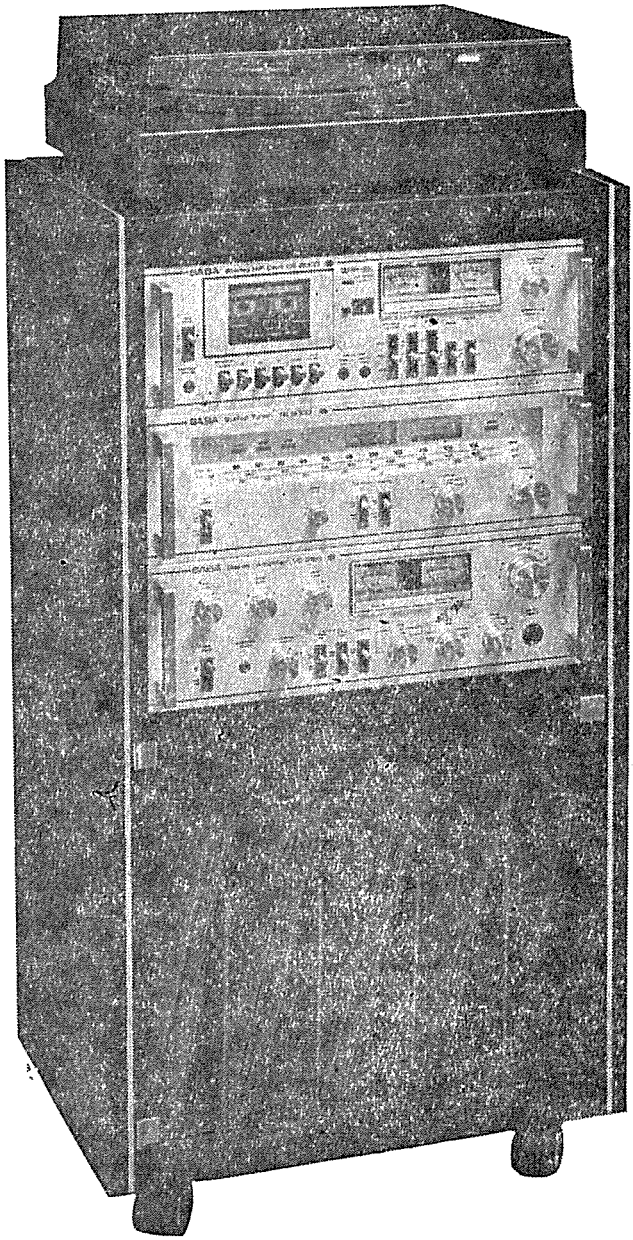

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A BRIEF ACCOUNT OF TERRITORIAL BEHAVIOUR IN ANIMALS

V. Axiaq

Hitler called it *Lebensraum*. Some are of the opinion that it is the cause of all capitalistic evils, while others defend it as an essentially basic human right. The acquisition of private property and the passion for a place of one's own is at the root of many of our economic and political issues. It may come as a surprise to some that this is no passion which man has acquired as a result of his culture or society. As an instinct, territorial behaviour — the need to acquire and defend a place of one's own, is widespread amongst many animals. It is encountered with in dragonflies, fiddler crabs, many fish, some reptiles and the majority of birds and mammals. One of the first to fully understand and study this basic animal instinct was Eliot Howard. [1] In 1920, after a lifetime of bird-watching and patient study of bird behaviour, he published (a book called) *Territory in Birdlife*, in which he rescribed how a male bird seizes a territory, defines its boundaries by his aggressive behaviour towards males of his own species, and how he earnestly sings his "no trespassing" warning signal to his neighbours.

The yellow bunting (*Emberiza citrinella*) is a small yellow bird with dark markings, quite common in the Northern countries, rural areas. In early February, the males leave the flock and seek out a particular perch — a bush, a hedge, a railing or even a gate. As soon as he acquires a territory he sings his warning song to warn and drive off any male intruders. Mating occurs only after a territory is set up. In many cases the male without a territory of his own neither sings nor succeeds in finding himself a female. [2]

The Stickleback (*Gasterosteus aculeatus*) is an aggressive looking small fish with three sharp spines on its back, inhabiting both freshwater and marine environments. In spring the male builds a nest on the sandy bottom with sea weeds cemented by renal secretions he produces. He soon acquires a red belly, becomes aggressive to any other male of the same species who intrudes in the vicinity of his nest and chases him away from his territory. Beyond his territory, the stickleback appears to lose much of his original aggression, while the former intruder picks up courage and becomes more aggressive the closer he gets to his own nest. He then starts to pursue the original chaser. At a certain point been the two adjacent territories, the two male sticklebacks glow at each other menacingly, but little actual fighting occurs. [3,4] A territorial boundary has

been set up! The size of a particular territory depends on the aggressive nature of its holder. This applies not just to sticklebacks but to many other territorial animals.

In the case of social animals, a territory can be occupied by a whole group of individuals — such as with the howler monkey (*Alouatta*). This relatively large New World monkey lives in small groups in the South American forests, each troop being made up of a few adult females, fewer males and their offspring. They make their way through the thick forest, travelling in file from one branch to another usually led by an old male (the one likely to have more experience) from one branch to the next. Each social group or family occupies a relatively fixed territory.[5] When two adjacent families meet at their territorial border, they express their hostility by vigorously howling at each other — but only in relatively rare cases do they engage in actual body combat. One such encounter has been so described. "When two groups sight each other, each on the fringe of its territory, all break into a total rage. Males, females, juveniles and infants become ants on a hot plate, leaping through the branches, scudding through the tree top, screeching, barking, chattering in frenzy. The forest cathedral becomes a green asylum for its insane habitants, and the howls of apparent melancholia become the shrieks of the truly demented!"[2] Evolution has provided this remarkable monkey with a magnificent howling organ in the form of a huge bony reverberating voicebox in its enlarged throat.

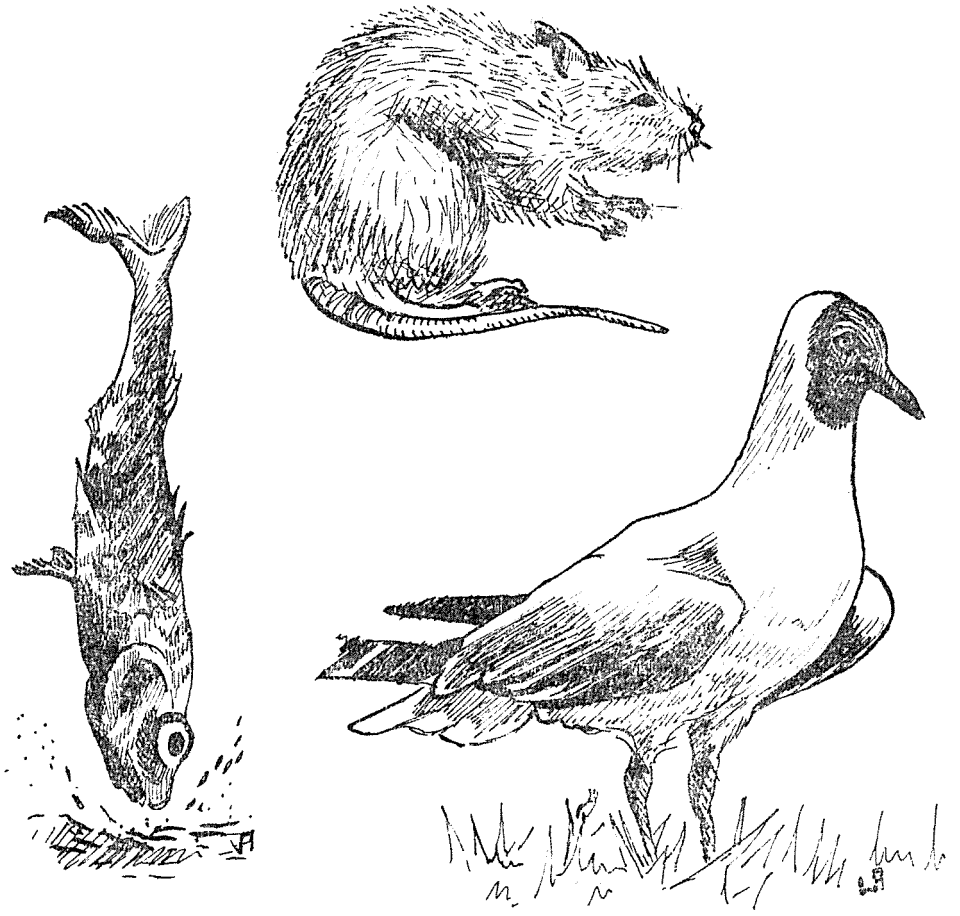
All animal behaviour must ultimately be adaptive in nature, that is it must have been slowly evolved to give some survival advantage to the particular species. The widespread occurence of territorial behaviour in so many different species, indicates its important selective value. One of the most important advantages gained by territoriality is the spacing out of individuals of the same species (i.e. — living in the same ecological niche) so that a given habitat will be more profitably shared between the population in terms of space, food and shelter. Such spacing-out of individuals may also help in checking against the spread of epidemic diseases, and in rendering them less conspicious to their natural predators. Moreover, the successful male possessing a territory ensures a successful mating season. This means that the successful male (who is uslally the one best adapted to survive and successfully compete in the particular environment) will have a greater chance of producing offspring carrying his successful genetic characteristics, and he will contribute more to the gene pool of future generations. In many cases the male without a private property is shunned by the females and does not succeed in mating. This is the very basis of the process of evolution by natural selection, often referred to as differential reproduction.

Several types of behaviour patterns are involved in acquiring

and maintaining a territory. The extent of a territory is usually dependent on the degree of aggressiveness of the male towards his neighbouring males. Such aggressive behaviour may be induced by the sight of an intruder. The male Stickleback is mostly hostile towards the sight of the red belly of his neighbour. Tinbergen [6] has clearly shown how even inaccurate models of fish are vigourously attacked by the male Stickleback when introduced in his territory in an experimental aquarium, as long as their bellies are painted red. Similarly, the red breast of the male Robin serves as the releasing factor (i.e. — the external stimulus inducing a particular type of behaviour) in territorial aggression, so that a robin may even attack an isolated tuft of red feathers stuck on his perch. [7] In the male Fence Lizard, it is the blue belly which releases territorial aggression.

However, if this perpetual state of aggression between neighbouring territory holders were to result in real fights leading to death, the territorial instinct would have defeated its own end, i.e. — the survival of the species. In reality, territorial aggression rarely leads to death since nature has evolved several mechanisms to ensure territoriality with the minimum body damage. In fact many territorial disputes are often settled by means other than body combat. The howling pandemonium raised by neighbouring troops of howling monkeys is a non-violent means of territorial aggression, and nearly never leads to actual fights. After his field studies on howling monkeys, C.R. Carpenter was convinced that another non-violent means by which these creatures repel any intruders is by urinating or even defacating on them. In fact, the specimens under observation frequently used him as their target!

In many cases, most territorial fights are in the form of "bluff" or "threat displays" — which is another adequate means of mutual repulsion between neighbouring males of the same species. Thus when his territory is endangered, a male Stickleback assumes a "threat posture" by standing vertically with his head down and erecting his ventral spine and vigorously fanning his fins and tail. The Black-headed Gull (*Larus ridibundus*) which nests colonially on marches, moors and the shoreline of marine and fresh waters, assumes a "threat posture" by ruffling his neck feathers, straightening his neck upwards and pointing his menacing beak downwards towards the intruder. The Brown rat (*Rattus norvegicus*) arches his back and with legs extended and partially raised fur, moves around his opponent with mincing steps. [8] Such threat displays may be the result of conflicting body actions due to attack and escape tendencies displayed at a territoral boundary. Other threat actions are referred to as "displacement activities" when they appear irrelevant in the particular situation in which they occur, and they may arise as a means of relieving aggressive tensions resulting from conflicting fight and flight drives. Thus the vertical



"Threat displays" in Brown Rat, Stickleback, and Blackheaded Gull.

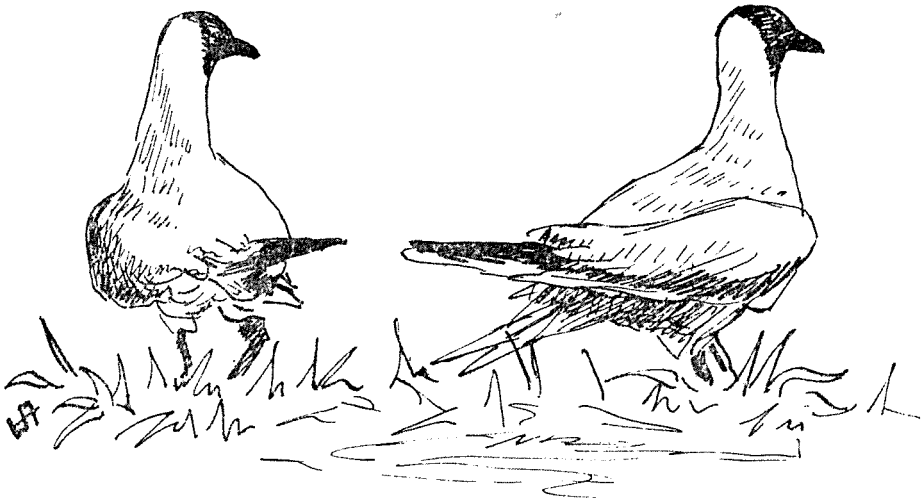
threat posture of the male Stickleback may be a simulation of sand burrowing for nest formation, while a threating Gull often tears at grass as if collecting building material for the nest. However this activity may become more energetic until the gull will aggressively pull at the grass as if pulling at its opponents' feathers. The intruder often backs off at such a display before it is too late!

In an effort to acknowledge defeat before the real fight, the intruder often displays certain "submissive actions" which induce the atacker to break off the fight. The intruding

gull acknowledges defeat by turning his head and pointing his beak away from the opponent, while the rat lies on his side with eyes half-closed in submission. In many cases, the submissive action takes the form of offering the most vulnerable parts of the body to the victor. Both the wolf and the dog acknowledge defeat by presenting their neck.

Another way of minimizing actual conflict as a result of territorial behaviour, is the marking of one's territory in an unmistakable way so as to discourage any likely intruder. Within an already marked territory an intruder usually becomes less and less aggressive. In the case of birds the male's song adequately announces its territorial rights, while many mammals mark their territory with special individual scents. Antelopes, hyaenas and deer mark bushes, trees and ground by secretions from special glands found above their eyes, while the Californian ground squirrel (*Sciurus carolinensis*) marks stones within its territory by rubbing them against dorsal glands. Brown Bears (*Ursus arctos*) which usually lead a solitary life and may maintain a territory of up to ten square miles, mark territorial trees by rubbing and urinating against them. The dog which cocks its foot against a wall is also presumably marking territory, while civets and ocelots use their own excreta as markers. The hippopotamus (*Hippopotamus amphibius*) lives in family groups, crowded and pressing together within a particular territory in a river. At night, this grazing creature comes out of his watery home and occupies a second territory along the river bank which provides him with the

Submissive action in Brown Rat



Submissive action in Blackheaded Gull

necessary plant food. The hippopotamus marks this territory by wagging his posterior rapidly while urinating and defacating, spreading this excreta over a wider area at certain strategic points within his territory.

The fact that many primates exhibit territorial behaviour might indicate that other primate Homo sapiens, is another territorial creature. In fact many ethnologists agree that many human actions result from a well-developed territorial instinct. Desmond Morris [9,10,11] distinguishes three types of human territories — tribal, family and personal. The tribal territory may be presented by a club, a school, a political party or a country, while the family territory is the home residence. The home territory is well marked by the garden wall, the name pinned on the front door, or even the personal style and taste for interior and exterior decorations. Territorial aggression is unleashed on the burglar breaking in the house, or even on an impolite visitor (who does not respect one's territoriality), while this aggression reaches ferocious levels in the event of some family being evicted from its house, or a whole population being forced out of its home country. How else can one explain the turbulent past three decades in the Middle East? While the two superpowers confront each other across the world in an effort to maintain a balance of power (or balance of influential territory — i.e. geopolitics) and while human territorial aggression is causing the out-

break of local wars, we may look at the two neighbouring Sticklebacks glowing menacingly at each other, or hear the howling monkey maintaining his territory intact by nonviolent means. Then perhaps we may finally understand.

REFERENCES:

1. HOWARD, E., *Territory in Bird-Life*, William Collins Ltd., London 1920.
2. ARDREY, R., *African Genesis*, Dell Publishing Co., New York, 1967.
3. TINBERGEN, N., *The Study of Instinct*, Oxford 1951.
4. LORENZ, K., *On Aggression*, Methuen, London 1967.
5. CARPENTER, C.R., *Behaviour and Social Relations of the Howling Monkey*, Comparative Psychology Monograph, Johns Hopkins University, 1934.
6. TINBERGEN, N., *Social Behaviour in Animals*, Methuen, London 1953.
7. LARCK, D., *The Life of the Robin*, London 1943.
8. BARNETT, S.A., "Rats" in *Scientific American*, Jan. 1967.
9. MORRIS,D., *The Naked Ape*, Cape, London, 1967.
10. MORRIS, D., *The Human Zoo*, Cape, London, 1969.
11. MORRIS, D., *Manwatching*, Cape, London, 1977.

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THE HOTSPUR OF THE NORTH

David Cremona

'I never heard the old Song of Persie & Douglas, that I found not my heart moved more than with a Trumpet,' wrote Sir Philip Sidney in his APOLOGIE FOR POETRIE, some time in 1580; a good seventeen years, that is, before the appearance of HENRY IV Part 1. He was referring to the border ballad most commonly known in its English version as 'Chevy Chase'. This recounts in a spirited fashion the events leading to the battle of Otterburn, one of the perennial savage engagements of Scot and Englishman, with the marcher lords of Douglas and Percy taking it in turns to raid or harass the age-old enemy across the debatable lands in between. The ballad is a fine example of its kind, presenting in simple, starkly heroic terms the affray which culminates in the death of both James of Douglas and of 'Earl' Percy, with a grim coda assuring all that King Henry IV later avenged his slain captain at 'Humbledown'.

Rousing stuff though it is, the 'old Song' garbles historical fact beyond easy recognition. The Douglas was indeed killed at Otterburn, but Percy — more familiarly known by his nickname of Hotspur 'for his often pricking' — survived the battle, though he never lived to inherit his father's Earldom of Northumberland. He was in fact taken prisoner by the thrifty Scots who subsequently demanded an outrageous ransom for his release. This was duly paid by his appreciative sovereign — still Richard II since this was in 1388 — and he was later his own avenger at Holmedon, or Homildon, where he had the satisfaction of capturing another Douglas, Archibald the fourth Earl, nicknamed by his own disgruntled countrymen 'the Tyneman' (the Loser). Certainly the Scot was consistently defeated by the English on his own native border, at Shrewsbury, and often later in France where, created Duke of Touraine and a Peer of that troubled realm, he was eventually to perish — in battle, needless to say. We need not quarrel with Shakespeare's lightly-drawn sketch of him which stresses, perhaps, a certain haplessness.

It was not with the historicity of the ballad that Sidney was concerned, however, so much as with its style and sentiment. Even to so refined a Renaissance courtier and critic, the rude stanzas made a powerful appeal. One of the most gifted men in an age spendthrift with talent, a lyrical poet of rare exquisiteness, a humanist and scholar second to none, and perhaps the last exemplar of the old chivalrous soldiership of a vanished era, Sidney was

basic Englishman enough to respond to the simpler values and cruder metrics of the ballad form. And if an aristocrat notoriously fastidious in his tastes could be moved, the commonalty of England were stirred to their very souls. Balladry, whether of the older and sterner sort or belonging to the more topical variety, satisfied a need in the public at large nowadays catered for by the entire range of fiction, printed or projected, or variously broadcast, and even supplied the place now filled by music from the austerities of Bach to the vast insensate yammering of the Top Twenty and of Pop Music generally. In consequence, popular heroes fired the imagination: Robin Hood, Edom O'Gordon and — by no means least — Hotspur had become part of the national consciousness.

Shakespeare knew well enough what rich source of interest he was tapping when, publishing his play in 1598, he titled it, 'The History of Henrie the Fourth; with the battell at Shrewsburie, between the King and Lord Henry Percy, surnamed Henrie Hotspur of the North. With the humorous conceits of Sir Iohn Falstalffe...' As a drawer of crowds, the name of Hotspur was invaluable to an unknown play. Once the crowds had come and seen it, very likely the attraction may have shifted to Falstaff, in his present form created by Shakespeare out of the whole cloth. Certainly it was for more of the fat rogue that the groundlings came to clamour; and even, it was said, the Queen's Grace herself. Though they share the credits in the title, their creator takes good care not to have the two meet in life: one or the other would have been deflated. With Percy dead, there is a kind of grim relish in having his carcass carted off the stage, just so much 'noble luggage' on Falstaff's well-padded shoulders: the most rashly gallant and the most tardily recreant of knights in one staggering conjunction.

When it came to the distortion of historical event, Shakespeare could be as ruthless as any balladeer. His Harry Hotspur is certainly not history's, even insofar as the character of the original may be assessed from scanty evidence. The chief divergence, however, is in the chronology. Sir Henry Percy had been born in 1364; he was consequently within a few months of his fortieth birthday at the time of his death at Shrewsbury. He was thus three years older than the Bolingbroke he had helped to make king in 1399. A famous jouster, a hard-bitten soldier of considerable experience, having fought the French and the Welsh as well as his marauding neighbours the Scots, he had often displayed that headlong impetuosity that had won him his name; but he had shown too that he could be patient and even wary when, as guardian of the thirteen-year-old Prince Henry, commanding under his ward's official banner the King's forces along the Welsh border, he had managed to contain the guerilla warfare of Glyndwr. (The prince seems to have held him in some affection though it is not recorded that he cared for Worcester,

also for a while his guardian when Hotspur had resigned his charge). Another point where Shakespeare alters his sources is that he has the King summon the Percys to Windsor to justify their recalcitrance. It had been the quarrelsome clan who had indignantly sought out Bolingbroke to dispute his right to the Scottish prisoners taken at Homildon. In a stormy interview, they so far provoked Henry's temper as to have him draw his sword on them, a gross breach of manners; and Hotspur stalked out with the ominous promise: 'Not here, but in the field!' Most important of all, undoubtedly, it was not the sixteen-year-old prince who killed his former mentor. Young Henry indeed had very narrowly escaped being seized in his headquarters at Chester Castle; it was only his father's energetic drive north and west which prevented this, bringing him there just in time to forestall the rebel forces. In the battle that followed, the prince, leading his men uphill against deadly archery, performed very creditably throughout a long and hard-fought afternoon and evening, refusing to 'void the field' in spite of a wound in the face. It was in the face too that Hotspur was fatally wounded: he had imprudently raised the visor of his bascinet to mop his brow, streaming with sweat after prolonged and bloody exertions in the July sunshine. Some anonymous royalist seized his opportunity. Exit Percy.

Filtered through the successive screens of biased contemporary mention, shocked condemnation, later re-assessment according to an alien scheme of political and politico-philosophical prejudices, further distorted by simplistic moralising and lip-service paid to the Tudor myth of kingship, what survived of the original Hotspur and his vicissitude had in turn to be submitted by Shakespeare to the exigencies of plot and theme. As always, these called for much shuffling of time, event and character. Of the last two, some might be given greater prominence, others yet, reduced. Their order and relationship too might be altered, sometimes drastically. It is clear enough, for instance, why the age of Hotspur should be more than halved, making him coeval with young Hal; even if Shakespeare was not blindly following an error in one of his sources, it fitted in very well with his strategy. The two Harrys, fated to be rivals in the matter of honour, are linked in age as in name by a kind of starter's handicap which makes for a fairer race. The contrast between the two at the opening of the play, laying careful stress on the excellence and honour of the one and on the 'riot and dishonour' staining the other, merely enhances the similarity by way of confrontation; more properly, it underlines the elements in common in order to bring out the diametrical opposition of character and disposition. It very soon emerges that Hotspur, wilful and riotous to the point of revolt, lacks even basic self-control, while Hal shows a chill detachment from the unworthy companions who are believed to be lead-

ing him astray which argues a strong self-possession. Hotspur's concept of honour, if it comes to that, is an essentially selfish, even a childish one. As parodied by Hal, it appears to involve the slaughter of a few dozen Scots before breakfast by way of appetiser, then rather more of the same later. This is burlesque, clearly. Yet even by his own declaration, he will have no 'corrival' in his honour, no 'half-faced fellowship'; he must have it all. One can perhaps see him as the prototype, *mutatis mutandis*, of the mindless athlete eternally jogging in a grubby track suit and plimsolls, impatient of anything that distracts him from his single-minded slog. Single-minded Hotspur unquestionably is; obsessed almost to the point of monomania with alarums and excursions. It is an absorption that incapacitates him from understanding, and far more from appreciating, anyone with interests, tastes, perceptions and aspirations other than his own. His reaction to all such is uniform: a gush of swingeing sarcasms and mocking mimicry, an overkill of contempt and scorn. Whether it is the king's emissary at Holmedon or the king himself at Windsor; whether the reluctant conspirator writing to him at Warkworth, or Glendower intoning diabolical roll-calls at Bangor; a prim confectioner's wife or a perjured king — all are guyed with vigour and relish. It is the least likeable, though not the least amusing, side of his impetuosity. The outspokenness here is not honesty but intolerance, an intolerance stemming from his innate inability to consider, let alone to show consideration for, other people. At best it is rudeness; and it is for rudeness that Mortimer mildly, and Worcestor roundly, berate him. His uncle's summing-up of this aspect of his character is as good as we have any right to expect. Culpable obstinacy, offensive insensitivity to the feelings of others, a total unamenability to persuasion — all these Hotspur shows time and again; he is moreover headstrong, opinionated, self-centred and self-willed, disdainful and petulant: qualities calculated to lose him friends and alienate allies and followers. At a time, and in a social class, which prized courtesy quite as much as prowess, such failings could overshadow even the most dazzling accomplishments. The wonder is that in Hotspur they do not. He remains a popular figure, with charisma enough to draw to his banner a following other than the malcontents, criminals and riffraff who generally form the stuff of rebellion. A by-word for chivalry, a spectacularly successful war-captain, and possessed of enormous charm and appeal, he bcomes an indispensable asset to Worcester's design; yet these virtues are the obverse side of the coin. Each is the gracious positive aspect of a disturbingly negative impulse. And before all is done, the negatives have doomed the enterprise, and Worcester too. The pattern is unmistakable.

In point of fact, Shakespeare had in some sort used his pattern before, and with an effect not unlike that

obtained in Greek tragedy. No personage could be less like the volatile Percy than the somewhat stodgily virtuous Brutus in JULIUS CAESAR. Nevertheless, in both plays a similar sequence is traceable: a man of considerable worth and prestige is inveigled into, and eventually induced to lead, an already existing conspiracy aimed at the chief authority in their respective states. In each case, this ruler has seized power unconstitutionally, by military invasion, and is now exercising it in a manner which the conspirators at least consider tyrannous and intolerable. In each case, too, the man is drawn in by a close relative, by blood or marriage, a man older, more experienced and far wilier: a Worcester or a Cassius. Manipulated by this slightly sinister figure, the naive victims, neither very intelligent but chosen for their popular appeal and credit with the masses, lend themselves to proceedings the consequences of which they only partly grasp; very soon however they take over the moral leadership and, by their short-sightedness and unwisdom, endanger and ultimately ruin the cause they have taken up. Whether in general policy or in eve-of-battle strategy, both overrule their wiser companions, and both in consequence involve their armies in a battle which they lose. Both perish in the course of that battle, directly or indirectly at the hands of a man whom they had earlier dismissed as of no consequence: a Hal or an Antony. And finally it is this 'unthought of' victor, emerging with glory in battle after a former career more notable for self-indulgence and loose-living than for responsible behaviour, who generously eulogises the dead man, Hotspur or Brutus. The mixed elements in the life of either in no way detract from the sense of tragic grandeur and pity in their deaths. The parallel cannot be extended without strain, nor is it necessary that it should be; but it forms a useful and not too obtrusive pattern. Nor can Shakespeare be accused of repeating himself, for the dissimilarities are far greater than the above suggests: for one thing, Brutus is the protagonist of his play, Hotspur merely a dynamic subsidiary in his. As affording some insight into Shakespeare's use of dramatic structures, it is not without interest.

What Hotspur has in common with that other vital subsidiary figure, the gross knight peccant, Sir John (in the symbology of the theme, that is), may be summed up in one word already used: Riot. That form of Riot particularly which may properly be called Excess. At its simplest we have an opposed polarity: an excess of energy, blindly directed, an excessive sense of 'honour', military, personal and familial on the one side; on the other, an excess of lethargy, moral every bit as much as physical, an excessive disregard for values of conduct and morality, even an excessive cynicism about the vocation of soldiership in general and the validity of 'honour' in particular. Once more, the similarity is enhanced by the very opposition, and *vice versa*. Hotspur's excesses — if the play on the word may be allowed to

pass — do not take him to disreputable taverns or even to bawdy-houses, nor does his superfluous energy need to expend itself in irresponsible scapegrace pranks — not so long as the supply of Scots holds good, keeping him pleasantly exercised. Nor would his sense of caste in any case have permitted him to scramble in back alleys. He has old-fashioned notions of what belongs to his rank — even his spirited young wife must not swear with the prissy 'refeenment' of a middle-class housewife with social pretensions. The honour of his house, particularly, comes very high with him. It is, in some sort, an extension of himself. Assuredly, no jumped-up hypocritical forsworn Bolingbroke is going to get away with slighting the Percys, let alone threatening them. Even a relation by marriage like Mortimer is adopted into the magic circle. He must be immediately and unquestioningly ransomed, at state expense, no matter the circumstances of his capture and his later sojourn with Glendower, now become his father-in-law. And an affronted Hotspur must have revenge, preferably at once, though he should risk his life in the process. What form this revenge shall take is immaterial: a starling taught to repeat 'Mortimer', given to the king to keep his anger perpetually asmoulder, or a rebellion which disrupts the king's peace, entailing rapine, slaughter, upheaval, and even parcelling out the ancient realm of England like so much booty — either will serve so long as the insult is wiped out. It is all very childish; and very terrible.

And this, in the final consideration, is Percy's personal tragedy, that he is the very epitome, in small things as in great, of that very concept of Riot which, with its reversed twin, Order, forms the duality which is at the heart of the play, though it is by no means all that the play is about. Prismatically fragmented into its component aspects, Riot is visible as impatience, restlessness, inability to endure obstacles trivial or formidable, rashness, imperviousness to reason, impulsiveness, stubborness, wilfulness, irresponsibility — a host of related faults which, with many other such, may be summed up as a defect in self-discipline, and leading fatally to a contempt for established society at large and more particularly for authority and the rule of law and custom — for anything but the wishes and whims of the avatar of Riot. Percy, significantly surnamed Hotspur, is precisely that. Opposed to the order and stability that a bleeding England so desperately needs to recover from a recent civil war, he must be suppressed if orderly life and the healing arts of peace are to be revived. True, this enemy of Order, first absolute of which is Peace, is no monstrous bogey, no embodiment of primal chaos or Satanic evil. Rather, he is a very young man, and his spontaneous excess is that traditionally associated with youth, and as such so often indulgently condoned. What arouses sympathy and affection for him is a quality of irresponsible innocence. In him, however, inno-

cence and harmlessness have separated. A great feudal lord, a general of dash and proven worth, a hero with a massive following, his capacity for harm is incalculable. His status requires responsibility. Without it, 'a hare-brained Hotspur governed by a spleen', he becomes a weapon to be wielded by unscrupulous and arrogant magnates in a cold-blooded bid for power. A weapon, but also a victim: the kinsman who abuses his *naivete* at the outset betrays his trust at the end: and the youth is traduced to death.

Hotspur, ineluctably, must die: the several exigencies of the play demand it. Death is implicit in his every function, look at the action as you will. The *beau ideal* of knightly excellence, rival to the princely aspirant to honour, cannot survive defeat by Hal. In turn, Hal cannot redeem himself except in terms of the vow he has sworn, by besting 'this all-praised knight': he is committed. Again, as the anarchic force menacing the organised state, he must be destroyed if primal order is to be restored. As a propitiatory victim for the aboriginal sin of rebellion, too, raising his hand against the Lord's anointed, he must bleed. But essentially he must die so that the Hal of Shrewsbury may become the Harry of Agincourt; it is the first bloody step leading from the prince who has been a truant to chivalry, to the hero-king who is to conquer the great domain of France; who, if coveting honour, were a sin, would proclaim himself 'the most offending soul alive'. Mere defeat would not suffice, even if one could imagine a Hotspur surviving his own defeat. He has been too vivid a character to live in the half-light; burned too intensely to be allowed to smoke and gutter. And then too, across time, the two Harrys find a final characteristic in common. For, like Henry the Fifth, Hotspur is perhaps 'too famous to live long'.

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'LE BOURGEOIS GENTILHOMME' DE MOLIERE

Jean-Benedict Werner

Le "Bourgeois gentilhomme" est un divertissement commandé par le roi, à l'occasion des fêtes de Chambord. La troupe de Molière joua la pièce, pour la première fois, le 14 octobre 1670. La recette atteignit plusieurs fois 1.000 livres, ce qui marquait un succès indaignable, d'autant que la cour avait applaudi à cette comédie-ballet, comédie de moeurs. Le roi, lui-même, avait proposé le thème: une turquerie. Lulli, musicien en titre de Louis XIV, en avait déjà composé plusieurs et la venue à Versailles, l'année précédente, d'un ambassadeur extraordinaire du Grand Seigneur conférait au "Bourgeois gentilhomme" une certaine authenticité. Laurent d'Arvieux,, voyageur en pays musulman, servit d'interprète à l'Envoyé et divertit la cour en lui contant des anecdotes turques. "Sa Majesté, dit-il, m'ordonna de me joindre à MM. Molière et Lulli pour composer une pièce de théâtre où l'on pût faire entrer quelque chose des habillements et des manières des Turcs..." Sa participation au divertissement se limita à commander, au maître tailleur, les habits et les turbans.

Quelle est l'histoire? Mr Jourdain, enrichi dans le commerce de drap, à qui les maîtres de philosophie, de danse, de chant, d'armes enseignent le savoir de la cour, apprennent les façons et le parler d'un "honnête homme", désire passer pour un noble. Mais ses grands airs ne trompent personne, le ridiculisent; sa femme, madame Jourdain, une solide bourgeoise, le morigène d'importance, sa domestique, Nicole, rit aux éclats en le voyant affublé d'un costume aussi mal porté par un roturier, comme lui, qu'une harde de vagabond l'aurait été par un duc et pair. Tout le monde se moque de lui; et d'abord Dorante, un gentilhomme, qui lui emprunte de l'argent, le payant de caresses, de promesses... Et Mr Jourdain de lui remettre la bagatelle de dix-huit mille francs, à l'effroi de Mme Jourdain, malgré la promesse de Dorante de les lui rendre au premier jour...

Les leçons, la sérénade, le dialogue en musique, les démonstrations de danse, la querelle des professeurs, l'entrée des tailleurs constituent les deux premiers actes; suit, au troisième, l'entrée des cuisiniers dansants; au quatrième, c'est le repas en musique, puis, le départ pour l'apothéose, avec Covielle, valet de Cléante, costumé et déguisé; puis, vient la cérémonie qui sacre Mr Jourdain "mamamouchi". Lulli, en 1670, tenait le rôle du muphti. Sa musique accompagne les séquences parlées, entraîne acteurs et figurants dans une danse effrénée, aux derniers actes.

Mr Jourdain a une fille, Lucile, amoureuse d'un certain Cléante, qui n'a qu'un seul tort: il n'est pas noble. Mr Jourdain refuse absolument de la marier à un roturier, même s'il professe, pour Cléante, de l'estime. Il faudra que ce brave garçon se transforme en fils du "Grand Turc" pour que l'union se réalise enfin. Pierre Gaxotte, qui consacra une remarquable étude sur la vie de Molière et son oeuvre, écrit ceci: "Le "Bourgeois" n'est pas la plus grande pièce de Molière; c'est une des plus intéressantes à étudier. A l'acte III, scène 10, Cléante et Lucile, Covielle et Nicole se donnent une scène de dépit amoureux, qui est un modèle de ces constructions symétriques que Molière affectionne. Le duo est ici quatuor, les domestiques répètent ce que disent les maîtres, de telle façon que leurs paroles s'entrelacent. Ajoutons à cela que les changements d'humeur et de résolution des deux hommes sont répétés par les deux femmes et réciproquement, de telle façon que l'un des deux couples tient rigueur quand l'autre supplie, et quand le premier s'adoucit, l'autre tient rigueur à son tour, jusqu'au moment où tout s'éclaire."

Cette oeuvre n'a pas l'ambition de traiter de la condition humaine, comme "le Misanthrope", "Don Juan" ou "Tartuffe". Elle repose Molière, harcelé par ses ennemis, qui calomnient odieusement ses pièces. Les enfants la préfèrent entre toutes, car Mr Jourdain est un grand poupon, qui joue à "faire semblant". Ils aiment les séances d'habillage, de danse, de chant, de philosophie, où on "fait de la prose sans le savoir"; ils rient, quand ses proches le mystifient, en lui laissant croire que le "Grand Turc" s'intéresse à lui et lui propose une alliance! Tout se passe dans la bonne humeur!

A ce moment de gloire, où le roi le consacre meilleur auteur de comédie de France, la cour le chérit, le public populaire l'adopte, (malgré les attaques fielleuses de ses éternels détracteurs) Molière n'a plus que trois ans à vivre. "Cependant, on ne discerne aucune ombre, aucune fatigue dans son jeu. Rien n'a altéré son génie. Il s'affirme, au contraire, plus riche, plus neuf, plus varié, plus imprévu..." (Pierre Gaxotte, "Molière"). Il lui reste à donner "Psyché" (en collaboration avec Corneille et Quinault), "Scapin", "la Comtesse d'Escarbagnas", "les Femmes savantes", enfin "le Malade imaginaire". Il est dans la plénitude de ses moyens. "Le Bourgeois gentilhomme" révèle un style parvenu à sa maturité.

Molière tint le rôle du "Bourgeois", qu'il voyait bilieux, et non sanguin, emporté, vif, sans cesse en mouvement; alors que son lointain successeur, Louis Seigner, qui l'interpréta de 1952 à 1974, était sanguin, bouffi, maladroit! En 1685, Rosimont reprit le personnage de Mr Jourdain, puis Paul Poisson, fils du célèbre Raymond Poisson, seul grand acteur comique rival de Molière, à l'Hôtel de Bourgogne au XVIIIème siècle, La Thorillière, Préville, qui fut le meilleur Jourdain de son temps et excellait dans les rôles de valets! Puis, vinrent, parmi les plus cités, Dugazon, Thénard, Michot, Thiron, Coquelin cadet,

Maurice Féraudy (1916). Jacques Charon, tout récemment décédé, est le dernier en date, à la Comédie Française. La meilluere mise en scène d'après guerre est, sans conteste, celle de Jean Meyer, simple, efficace, où Louis Seigner donna toute sa mesure.

Plus qu'un aimable passe-temps, moins qu'une oeuvre de grand souffle, "le Bourgeois gentilhomme" prend place, pourtant, parmi les merveilles de l'écriture classique, par la promptitude des répliques, la drôlerie des situations, l'élégance du parler. C'est l'exemple du comique sans prétention au didactisme. C'est français, donc!

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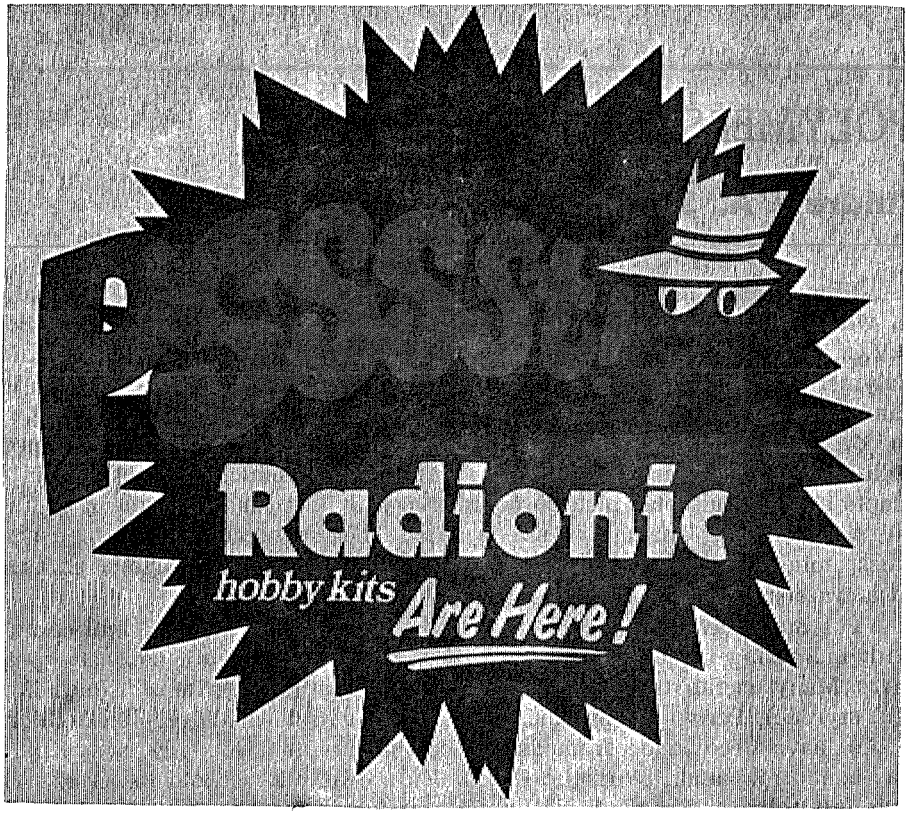

The Radionic Story

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POLYMERS

Andrew A. Sultana

From the chemical point of view, polymers comprise long molecules in which the same basic unit is replaced many times. Polyvinyl chloride, P.V.C., a typical polymer consists of vinyl chloride units linked together. Polymers occur widely in nature. In the inorganic world, rocks, clays and sands are all polymers based on units containing silicon and oxygen. In the organic realm, the structural materials of living organisms are polymers: cellulose in plants and proteins in animals. The products of metabolism of plants and animals may also be polymeric. One important example is natural rubber — a long chain of isoprene units. This substance occurs in certain trees, notably species of *Hevea* as a latex: a suspension of polymer particles in a watery serum.

Polymers have been produced synthetically during the past half-century with increasing frequency. Most of the familiar plastics are synthetic polymers. Many useful rubbers, for example Buna (butadiene), Buna S (butadiene and styrene), Perbunan (butadiene and acryonietnide) and Neoprene (chloropene), have been made from simple compounds, and recently rubber itself has been replicated.. Synthetic fibres also are now household materials. The building units of the synthetic polymer industry, the simple molecules from which the more complex ones are built, derive from two principal sources: petroleum and coal tar.

In physical properties most polymers fall into one of the three classes — plastics, rubbers and fibres. Some polymeric materials can be stretched to many times their initial length, yet on releasing return to their original dimensions. These are called rubbers. Plastics cannot be reversibly deformed in this manner, and are often hard and glassy. Nylon and other high polymers are characterised by marked readiness to form fibres strong along their length but often weak laterally. Such man-made fibres can be spun woven or knitted into fabrics. The characteristic elastic properties of rubbers are associated with the fact that although their molecules are exceedingly long, the different parts of the molecular chains can undergo independent thermal vibrations. The result is that in the unstrained state the molecule has a random, kinked configuration. Application of stress, causes the kinked molecular chains to straighten out, thus permitting large-scale deformation. On releasing the stress, the molecules return to their irregular arrangement, and so a piece of rubber contracts to its original dimensions.

A possible transitory configuration of a rubber molecule (omitting side chains) may be illustrated by bending a wire at intervals representing the

distance between carbon atoms, at a valence angle of 109°28′ and in spatial direction determined by the throw of a die.

Because long rubber molecules entangle and only occassionally slip when the material is stretched, the elastic property of the individual molecules is conferred on the mass.

Rubbers

Two million tons of natural rubber come from the cultivated trees of Malaysia, Indonesia, Thailand and Ceylon. When the bark of the *Hevea Braziliensis* is cut, a milky white latex flows out slowly. Solid rubber is obtained from latex by adding methanoic and ethanoic acids, whereupon a spongy coagulum is formed which may either be dried in air (to give pale crêpe) or in smoke (to give smoked sheet).

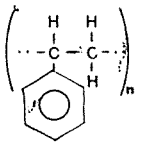
Before they can be shaped to form useful articles, rubbers must be softened or "masticated" by kneading betwen rollers or rotors. This process produces reduction in the chain length of the rubber molecules. The shortened rubber molecules slide over one another more easily, and so the resilient material acquires plasticity. This is measured by the Mooney plastimeter and similar instruments.

When the softened rubber has been shaped it has to be vulcanised to regain its elasticity, increase its strength and reduce its sensivity to changes of temperature. Vulcanisation is achieved by chemical cross-linking (i.e. bridging) of the individual polymer molecules to give a three-dimensional molecular network such that the giant molecule of vulcanised rubber in the classical sense may well be the whole of the piece. Vulcanisation can be accomplished by the use of many agents, notably sulphur, under the influence of heat and pressure. Accelerators and activators are chemicals used to reduce the time and temperature necessary to achieve the optimum elastic properties.

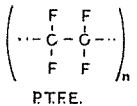
Fillers are incorporated in rubber to achieve special properties desired in the vulcanised product or to cheapen the mix. Carbon black increases tensile and tear strengths and enhances the abrasive resistance of rubbers so markedly that it confers improved wearing properties: features of great importance in tyres and similar applications. For increased heat resistance, asbestos is used as a filler. Cotton fibres are chosen as fillers for improved toughness, and mica powder for electrical applications.

The vulcanising ingredients, fillers and other additives are incorporated following mastication. The formulation of a rubber compound to meet specific requirements is of ten difficult, and calls for knowledge and experience.

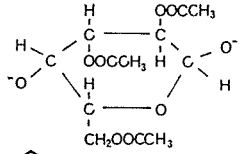
Synthetic rubbers are materials exhibiting special properties long sought. Thus neoprene and butadiene-acrylonitrile rubbers display resistance to oils and solvents, whereas silicone rubbers show outstanding heat resistance.



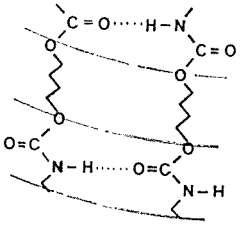
polystyrene



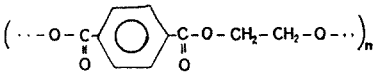
P.T.F.E.



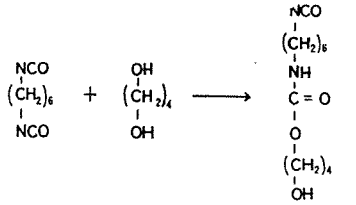
part of cellulose acetate (Rayon) giant molecule



Interchain hydrogen bonds (polyhexamethylhexadipamide in Nylon - 6,6)



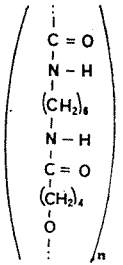
Terylene
(polyethyleneglycolterephthalate)



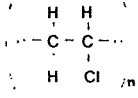
hexamethylene di-isocynanate

-1,4-diol

urethane

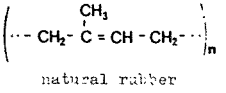


Polyurethane

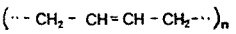


Polyvinyl Chloride

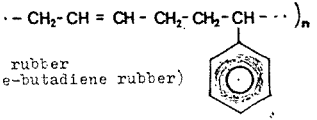
where n is of the order 1000



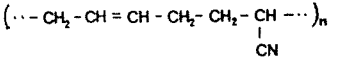
natural rubber



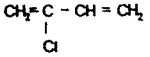
Buna rubber



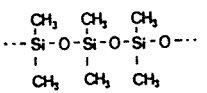
Buna S rubber
(styrene-butadiene rubber)

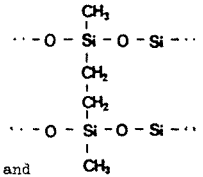


Perbunan
(butadiene-acryloritrile rubber)

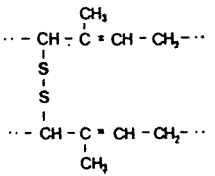


Neoprene

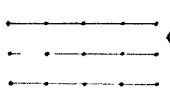




Unvulcanised (above) and Vulcanised (right) Silicone Chains

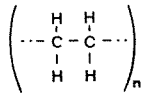


Simple Sulphur Bridge between two Polyisoprene chains in cured natural rubber



Thermoplastic Material after Heating

Thermosetting Materials after Heating



polythene

Styrene-butadiene and butyl rubbers can replace natural rubber in many applications and are regarded as general purpose substituents of natural rubbers. These however process differently, butyl rubbers being unique in their low permeability to air.

Natural rubber and many of the synthetics may also be processed directly in the latex form to produce such familiar articles as latex foam cushioning, rubber gloves and balloons. Latices are also used in paper-making, textile treatments and in many other applications. This is a growing branch of industry with special appeal to the colloid chemist,

Efforts to make "artifical natural rubber" succeeded only as recently as 1955 when in Milan, Italy, Professor Guilio Natta managed to produce cis-Polyisoprene (Isoprene Rubber) by ionic polymerisation of isoprene.

Plastics

The molecules of plastic materials are of considerable size but are more rigid and less prone to the independent thermal vibrations which characterise the molecules of rubbery polymers. The hardness of these materials may be enhanced by crystallisation.

There are two main types of plastics: thermoplastics and thermosets. Thermoplastics, which include polythene, PVC, nylon, and polystryene, can be reversibly softened by heating. The process of softening thermoplastics by heating them — and hardening them by cooling — can be repeated over and over again because the chains of molecules of thermoplastic materials remain unaltered after heating. Thermoplastics, therefore, are not used to make objects that must resist high temperatures.

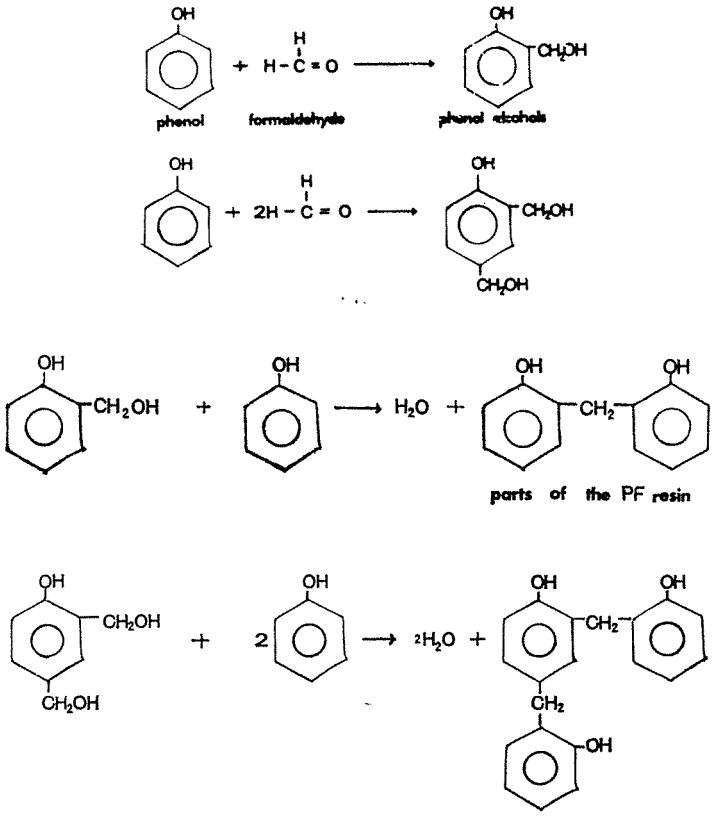
Thermosets, which include polyester resins (often reinforced with fibre-glass), phanolic, urea resins and melamine resins, are irreversibly hardened by heating. They can be softened and hardened only once when they are first heated. This is because their chains become permanently cross-linked in the process. Chemical cross-linking of the polymer molecules responsible for the peramanent hardening of thermosetting material after heating is analogous to vulcanisation of rubber. Articles made from thermosetting materials therefore have good heat resistance.

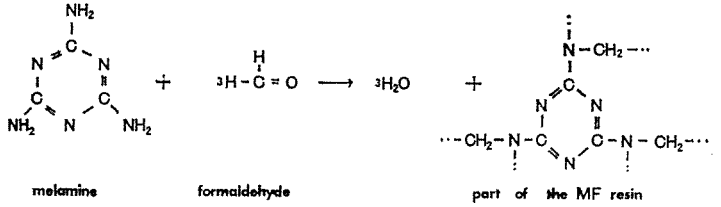
Plastics are being increasingly used in industry and in the home. They are often used as a substitute for traditional materials such as wood, iron, glass and ceramics. Frequently they cost less and perform better. Here is a list of some important properties found in all plastics:

Rot and corrosion resistance, Good electrical insulation, Good thermal insulation, Lightweight (especially the expanded or foam varieties), Flexibility or rigidity, Ease of colouring "right through", Strength, Ease of moulding, Low cost (and hence suitable for mass production).

Individual plastics, however can be made with very distinct properties.

Polythene is an electrical insulator both at high and low frequencies; but the housewife knows it as the versatile and welcome replacement for household porcelain, china, glass and vitreous enamelware. Plasticised polyvinyl chloride stands up extremely well to drastic weather and is popular in the form of thin sheeting and as cable sheating. Polystyrene can be crystal-clear and sparkling in refrigerator liners in the kitchen, beakers in the bathroom and lampshades in the livingroom. When reinforced with fibre glass, polyster has amazing strength and is already replacing metal for many car components such as heater units, lorry cabs, sports car bodies and boat hulls. Phenolformaldehyde (PF resin) and melamine-formaldehyde (MF resin) mouldings and castings are widely used in electrical applications such as switches, plugs and sockets. Polystyrene, polymethyl methacrylate, nylon and an extensive range of other polymers are contributing to the high standard of living now considered a birthright.





The plastics industry is just over thirty years old and growing fast. Plastics are used everywhere — at home, in biulding construction, in transport and communication, on the beach, in sports arenas, schools and nurseries, on farms, in factories and in hospitals.

In the kitchen, washing-up bowls and opaque squeeze bottles are made of polythene, door handles of phenolic resin, transparent fruit squash bottles of PVC, unbreakable crockery of melamine resins, refrigerator liners of polystrene and insulating ceiling tiles of expanded foamed polystrene. In the PVC) and gliders (nylon or polystrene) and gramophone records of PVC. beakers of polythene or polystrene and lavatory seats of phenolic resin. In the living room carpets are frequently made from nylon or other synthetic polymeric textiles, washable wall coverings of PVC — coated paper, lampshades of polystyrene, upholstery of flexible PVC, curtain tracks (rigid PVC) and gliders (nylon or polystrene) and gramophone records of PVC. In the wardrobe much plastic material is used in clothing. Fashionable wear and raincoats are made of flexible PVC and so are composition shoe soles; buttons are made of formaldehyde or polyester while nightwear and tights are made of brushed nylon.

Plastics are widely used for rainwater pipes and guttering (rigid PVC), water tanks (polythene), electric plugs and sockets (phenolic and urea resins), electric cable sheeting (flexible PVC) wall cladding and corrugated roofing (rigid PVC). Acrylic sheets and panes are used in canopy barrel roof vault and dome roof applications. Prefabricated house units and packaged house mouldings are being extensively used in building construction because they are light and need no painting. Houses, and recently a whole town named Plasticite in France, have been built almost entirely of plastics but restirictive building codes have been enacted partly due to opposition from traditionalists in the building trade unions and partly due to fire risks.

In transport, plastics are replacing metal for many car components such as heater units (polyester), washer bottles and fuel tanks (polythene), distributor caps (phenolic resins) and small gears (nylon). Larger components such as long cabs, sports car bodies and boat hulls are being manufactured in glass-reinforced polyester. In the transportation fields, shipping containers range from various bottles (or carboys) of 15 gallons capacity and drums of 55 gallons capacity which are made of polythene to flexible barges (or

dracmes) of 10,000 gallons capacity used for transporting oil, which are made of nylon and neoprene. The newly developed baggage expediter is moulded from glass-reinforced polyester resin and is designed to speed up the loading and unloading from jet airlines. Space travel and satellite communications would be impossible without many of the tiny components which can be made only with plastics. High temperature plastics are used in nose cones of missiles because during re-entry into the earth's atmosphere the nose cone of a rocket heats up to 16,000°C for about 20 seconds. It has been found that certain phenolics and phenyl silanes when reinforced with glass, asbestos or quartz fibres are ablative. Ablation in rocketry refers to the erosion of the hot outer side of the cone while enough of the inner part remains undamaged to provide necessary structural strength. As the temperature rises, some additional cross-linking of the polymer occurs. The outer layer is broken down by the heat and flakes off and the exposed fibres melt to form a highlyreflective surface which resists further erosion and reflects the heat away from the surface. The low conductivity of the resin protects the instruments inside the cone.

The eye-appeal and strength of plastics are put to advantage in air-beds (flexible PVC) so common in summer on the beach; squeaky toys and dolls (flexible PVC) in the nurseries; construction kits and models (polystyrene and polythene) as visual aids in schools; play-balls and handle grips (flexible PVC) and even artifical ski slopes (polythene).

Wherever you look you will find plastics helping to extend man's scope — and his life. The precooked packed foods, so popular in developed countries, include the instant breakfast polyester-film pouch which is kept in boiling water for ten minutes and scrambled eggs and precooked bacon are ready to serve. Flouroplastics are literally extending man's life as minute quantities of them are used in replacement of heart valves, joints and even arteries. The Starr-Edwards artificial heart valve is made of silicone rubber and a ring of PTFE (polytetrafluroethene), both chosen for their chemical inertness so that they they cause minimum tissue reaction. This heart valve is placed in position by sutures made of polyester fibre coated with PTFE. Plastics are very popular and versatile. PTFE is put to great industrial and domestic use. Because of its excellent non-stick properties it is used in thin coatings as a nonstick surface for cookware and is often used for lining food mixing equipment when sticky products such as chocolate, dough and coffee are being handled. As it has a very low coefficient of friction, it is used as greaseless bearing and for lining the skis of transport planes which have to land and take-off in icy conditions and for lining bearings operating under corrosive conditions or at elevated temperatures. It is used in electric insulators, wire covering, valve seats, seals and gaskets.

Fibres

Synthetic fibres made from various plastic polymers are used in products varying from heavy tow ropes to fine textiles. The basic requirements for fibres for textiles include a high tensile strength and a melting point (between 200°C and 300°C). This is high enough for garments to be ironed without damage but not so high that spinning the fibre in its molten condition (i.e. extruding it through very fine holes of a spinneret) becomes impossible. Synthetic fibres may be extruded from a solution of the polymer in a volatile solvent (excluding any solvent used in dry cleaning), e.g. cellulose acetate in acetone, and then evaporating the solvent. Some synthetic fibres are not attacked by moths, bacteria and fungi and have press-retaining properties superior to natural fibres. However they frequently have low softening temperatures which necessitate caution in ironing. They can also cause allergies. For high strength a primary requirement to any polymer is a minimum molecular length. In a fibre moreover powerful forces must exist between the chains to hold them together; hence the importance of molecular order and the close-packing of chains so that attractive forces (hydrogen bonds) are developed between adjacent components of the chains. These bonds link together chains in polymers containing hydroxyl groups (cellulose acetate), animo groups (polycaprolactam) and some other groups. In the polymerisation products of ethylenic and closely allied hydrocarbons (polythene, polypropene) interaction between chains is due to intermolecular dispersion forces of attraction which are weaker than hydrogen bonding. The cohesion of the chains must be amenable to temporary breakdown as the strength of a hydrogen bond and/or other secondary interchain connection is only one tenth that of the single covalent bond between carbon atoms. Otherwise the chains could not move in relationship to one another as they must during extrusion, when cohesion is lost on heating and re-established on cooling.

Monomers (Starting Molecules) of Nylon in commercial production:

Nylon —6	$NH_2(CH_2)_5COOH$		
Nylon —6,6	$NH_2(CH_2)_6NH_2$	and	$COOH(CH_2)_4COOH$
Nylon —7	$NH_2(CH_2)_6COOH$		
Nylon —6,10	$NH_2(CH_2)_6NH_2$	and	$COOH(CH_2)_8COOH$
Nylon —11	$NH_2(CH_2)_{10}COOH$		
Nylon —12	$NH_2(CH_2)_{11}COOH$		

The names in the first column are derived from the numbers of carbon atoms in the monomer molecules.

All polymers used for making fibres have a crystalline structure. In some cases, such as in polythene and Nylon — 6, 6, crystallinity develops only when the fibre is drawn. The specific properties of a fibre reflect the detailed structure of its chains, for example the melting points of Nylon — 6 and Nylon — 6, 6 are 215°C and 265°C respectively.

An important property of all crystalline polymers is their CRYSTALLINE MELTING POINT (Tm), which is the temperature at which crystalline structure or molecular order disappears and the substance becomes liquid. For a fibre Tm must be well above room temperature.

When polymers are heated they change physically at a temperature called Tg (glass transition temperature) before the crystalline structure melts. At Tg the thermal motion of the chain segments becomes sufficient to lend the chain a certain flexibility and the retarding effect of the interaction with adjacent segments of other chains is overcome. Below Tg, polymers are in the glass state, that is, they are hard, rigid and rather brittle (and are transparent if the polymer is amorphous but opaque if the polymer is crystalline).

For stretched rubber (crystalline polymer)

$$Tg = -80°C \quad \text{and} \quad Tm = 15°C$$

There are various textile fibres with specific uses. Rayon yarns which may be viscose or cuprammonium are regenerated cellulose fibres in which 15% of the hydrogen atom in the — OH groups have been replaced in a cross-linking operation after the natural polymer has been dissolved and reprecipitated as very fine fibres. They may be monofilament (i.e. single filament extruded as a unit), multifilament (i.e. more than one filament extruded through small openings in a die and then twisted to form a single thread) or staple (i.e. cut into small pieces and then spun), with a high lustre or delustred by colourless pigments.

Textile rayon is used in a wide variety of fabrics, both alone and blended with other fibres, because rayon is readily dyed and is resistant to mildew and moths. High tenacity rayon is used as a cord to reinforce automobile, truck and aircraft tyres.

Nylon yarns have high tenacity, wet strength, extensibility and abrasion resistance. They are used in hosiery, parachutes, glider ropes, transmission and conveyor belting, cordage, fish lines, tyre cord and fabrics. Coarse monofilament nylon is used in tootbrushes, paintbrushes and in tennis rackets. Polyacrylonitrile is made into textile fibres which have moderate strength, low stretchability, low heat conductivity, and low softening point. They are used in light-weight, warm, wrinkleresistant and good-wearing fabrics.

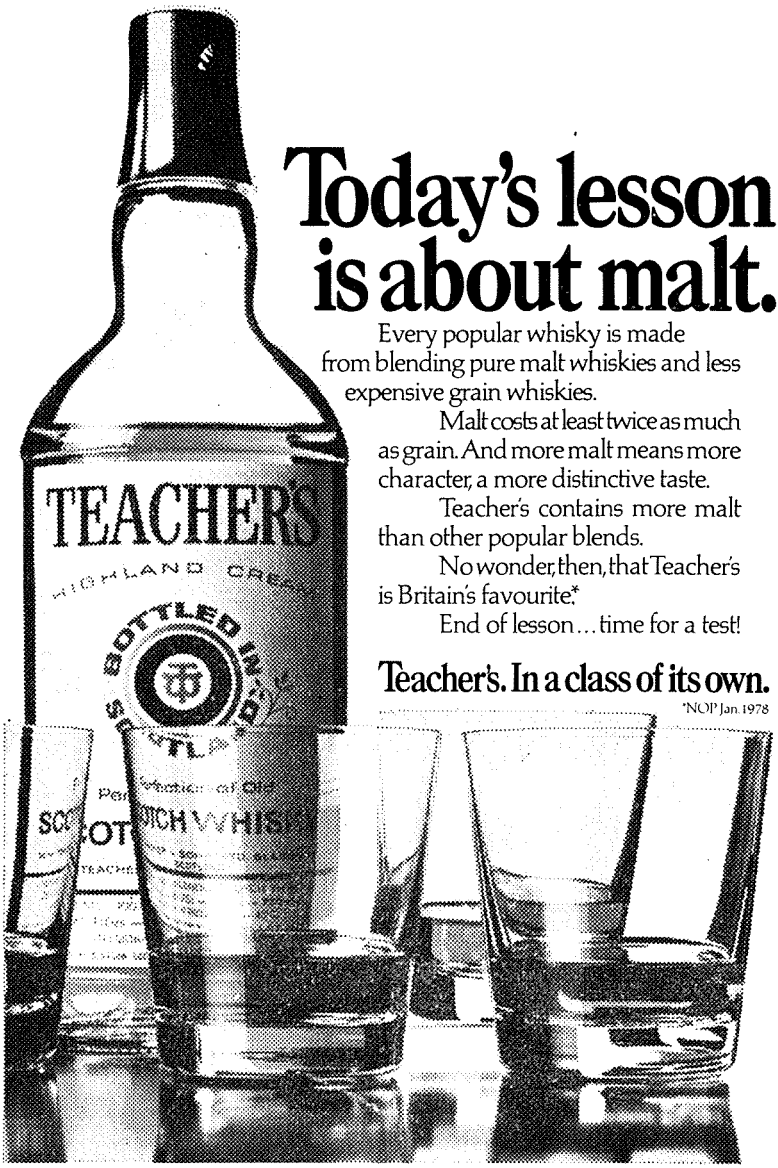
Polyolefin fibres consist of polypropene (or polythene) extruded into fibres in the molten state followed by cooling in a water bath. They have

a limited use in dress fibres and are used in protective clothing and in carpets.

Natural and synthetic fibres (elastomers) are extruded into elastomeric fibres with polyurethane. Spandex elastic fibres consisting of 85% polyurethane, are superior to natural rubber in resistance to oxidation, chafing and dry-cleaning damage. They have excellent resistance to abrasion, ultraviolet light, weathering, chemicals and cosmetics and are used in foundation garments, swim-wear, surgical hose and other elastic products.

The development of optimum properties in any given application of polymers is often a matter of some nicety calling for technological skill and experience as an extensive knowledge of advanced chemistry, physics and engineering is required, coupled with a first-hand practical acquaintance with the raw materials.

ANDREW A. SULTANA is Head of the Chemistry Department at the Upper Secondary School, Valetta.



Today's lesson is about malt.

Every popular whisky is made from blending pure malt whiskies and less expensive grain whiskies.

Malt costs at least twice as much as grain. And more malt means more character, a more distinctive taste.

Teacher's contains more malt than other popular blends.

No wonder, then, that Teacher's is Britain's favourite.*

End of lesson... time for a test!

Teacher's. In a class of its own.

*NOP Jan. 1978