A Chromosome Atlas of the Genus *Dactylis* (Part two)

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Foreword

The geographical distribution of chromosome races in the genus *Dactylis* L. has been the subject of an extended survey in the search for new sources of genetic variation in this economically important herbage grass. Some 400 populations of wild *Dactylis* for the most part grown from seed derived from the indigenous vegetation of Europe, W. Asia and the Mediterranean have been grown at Aberystwyth for observation as spaced plants. Chromosomes were counted in sample plants from each of these, usually at first meiotic metaphase. The data pertaining to half of the collection have already been presented (Jones, Carroll and Borrill 1961). A similar format has been adopted for the information obtained subsequently, and the results are given here in the form of a map supported by a detailed list of localities.

The distribution of *Dactylis*

The general distributional features of *Dactylis* were discussed in the first article. The present data confirm and extend this pattern. Tetraploids are the predominant form in the group.

In regions of Mediterranean climate *D. glomerata* ssp. *hispanica* is the principal type, and amongst new localities, the Tunisian region is included for the first time. Further stations are reported in Portugal for the Mediterranean coastal *D. marina* which has also been found at Cap Serrat in Tunisia (Map 368). The verified distribution of temperate ssp. *glomerata* has been extended, especially in N. Spain and France. The two chromosome atlas maps taken together summarize the distributional information at the present time.

Diploid material accounts for perhaps 5% of all wild *Dactylis*. These diploids occur somewhat sporadically throughout the area of distribution of the tetraploids. Individual diploid subspecies, though they may be small in numbers of individuals and restricted in distribution, are of considerable genetic interest since they are the surviving relatives of the ancestors of the whole group (Fig. 1).

The tetraploid *D. marina*, which has a distinctive phenotype and is limited to coasts in the Mediterranean-subtropical area of distribution, has obvious affinities with diploids in the same region, notably ssp. *smitii*, *ibizensis*

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Fig. 1. Chromosome atlas *Dactylis L.* (second part)
 ○ locality for diploid ● locality for tetraploid
 Insert=Cap Verde Island

Table of chromosome numbers

Map ref. no.	FAO index no.	W. P. B. S. accession no.	Site of original collection		Source of material	No. of individual genotypes counted	2n =
			Country	Locality			
Tetraploids: <i>Dactylis glomerata</i> subsp. <i>hispanica</i> Roth.							
223	5709	Bc 4799	LE	Cedres de Beharre, 6000 ft.	W ₁	3	28
224	5711	Bc 5512	LE	Vkassine, W. slopes of S. Lebanon	W ₁	24	28
225		Bc 5220	PO	Ericeira	W ₁	1	ca 28
226		Bc 5224	PO	Near Evora	W ₁	1	ca 28
227		Bc 5226	PO	Foia	W ₁	1	28
228		Bc 5227	PO	Hillside, valley of river Torgal	W ₁	2	28
229		Bc 5228	PO	Pocinho, by bridge over Douro	W ₁	1	28
230		Bc 5229	PO	below village of Monchique	W ₁	1	28
231		Bc 5241	PO	Loures	W ₁	1	28
232		Bc 5304	FR	Morbihan, coastal dunes at Quiberon	W ₁	1	28
233		Bc 5314	FR	Finistère, sea cliffs at Lochrist	W ₁	1	28
234		Bc 5363	TU	Sedjinane	W ₁	2	ca 28
235		Bc 5364	TU	Djebel Bargan	W ₁	2	28
236		Bc 5365	TU	Fériana	W ₁	2	28
237		Bc 5366	TU	La Kessera	W ₁	3	28
238		Bc 5369	GR	1 km. W. of Anophi	W ₁	2	ca 28
239		Bc 5370	GR	20 km. S. of Thivai	W ₁	4	ca 28
240		Bc 5371	GR	Just N. of Lamía	W ₁	1	28+2B
241		Bc 5372	GR	Gulf of Strimón, small valley at s. l.	W ₁	3	28
242		Bc 5373		8 km. N. of Sevai	W ₁	2	28
243		Bc 5432	IS	Beisan valley, N. Israel	W ₁	1	28+2B
						9	28
						3	28

(to be continued)

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Tetraploids: <i>Dactylis glomerata</i> subsp. <i>hispanica</i> Roth.							
244		Bc 5435	IS	Mount Carmel	W ₁	3	28
245		Bc 5436	IS	Jerusalem	W ₁	3	ca 28
246		Bc 5451	FR	Pas de L'Escalette, top of pass	W ₁	3	28
247		Bc 5452	FR	Pas de L'Escalette, 4 km. further down	W ₁	3	28
248		Bc 5453	FR	7 km. S. of Lodève	W ₁	3	ca 28
249		Bc 5454	FR	Aigues Mortes	W ₁	3	28
250		Bc 5456	FR	8 km. E. of Apt on highway N. 100	W ₁	3	28
251		Bc 5457	FR	18 km. E. of Apt on highway N. 100	W ₁	3	ca 28
252		Bc 5458	FR	3 km. N. E. of Forcalquier	W ₁	3	28
253		Bc 5483	IT	3 km. S. of Follonica	W ₁	3	28
254		Bc 5484	IT	13 km. S. of Narni	W ₁	2	28
255		Bc 5485	IT	3.5 km. S. of Umbertide	W ₁	1	29
256		Bc 5926	JO	Amman	W ₁	3	28
Tetraploids: <i>Dactylis glomerata</i> subsp. <i>glomerata</i> Hayek							
257		Bc 4904	NO	Hattfjeldal, Tjøtta	W ₁	1	28
258		Bc 4907	EI	Slea Head, Dingle Peninsula	W ₁	1	28
259		Bc 4908	EI	Inch, below Brickany Mountain	W ₁	1	28
260		Bc 4909	EI	as Bc 4908, but different population	W ₁	1	28
261		Bc 4910	EI	Anascaul, Dingle Peninsula	W ₁	1	28
262		Bc 4911	EI	Cloghabrien, Tralee Bay	W ₁	1	28
263		Bc 4912	EI	Farm of Alex O'Donnell, Tralee Bay	W ₁	1	28
264		Bc 4913	EI	"The Kerries" farm, Tralee Bay	W ₁	1	28

(to be continued)

(to be continued)

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Tetraploids: <i>Dactylis glomerata</i> subsp. <i>glomerata</i> Hayek							
265		Bc 4914	EI	8 km. N. of Oyster Hall, Tralee Bay	W ₁	1	28
266		Bc 4915	EI	Fenit, Tralee Bay	W ₁	1	28
267		Bc 4916	EI	On seashore nr. Dinis, Killarney.	W ₁	1	ca 28
268		Bc 4917	EI	Derrynane Bay, shore opposite Abbey Is.	W ₁	1	28
269		Bc 4918	EI	Abbey Island, Derrynane Bay	W ₁	1	28
270		Bc 4919	EI	Lamb's Head, Derrynane Bay	W ₁	1	28
271		Bc 4920	EI	Coast near Allihies	W ₁	1	28
272		Bc 4921	EI	Kilmakillage harbour	W ₁	1	28
273		Bc 4922	EI	Lehid harbour	W ₁	1	28
274		Bc 5230	PO	Oura	W ₁	1	28
275		Bc 5231	SP	Near Betanzos on highway N. 6	W ₁	1	29
276		Bc 5232	SP	5 km. from Navia on Oviedo road	W ₁	1	28
277		Bc 5233	SP	Junction Covadonga-Santander road	W ₁	1	28
278		Bc 5234	SP	3 km. from Carrena, in foothills of Picos de Europa	W ₁	1	28
279		Bc 5235	SP	Between Las Caldas de Besaya and Los Corrales	W ₁	1	28
280		Bc 5236	SP	Torre la Vega, on highway N. 611	W ₁	1	28
281		Bc 5237	SP	37 km. from Santander on Bilbao road	W ₁	1	ca 28
282		Bc 5296	FR	Stangar Bacol, Finistère	W ₁	1	ca 28
283		Bc 5297	FR	Méré, Seine et Oise	W ₁	1	28
284		Bc 5298	FR	Sainte-Mère Eglise, Manche	W ₁	1	27
285		Bc 5299	FR	Braspars, Finistère	W ₁	1	28
286		Bc 5300	FR	Baguer-Pican, Ille et Vilaine	W ₁	1	28

(to be continued)

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			Country	Locality			
Tetraploids: <i>Dactylis glomerata</i> subsp. <i>glomerata</i> Hayek							
287		Bc 5301	FR	Arrandon, Isère	W ₁	1	28
288		Bc 5302	FR	Lefpin au Haras, Orne	W ₁	1	28
289		Bc 5303	FR	Morlaix, Finistère	W ₁	1	28
290		Bc 5305	FR	Roscoff, Finistère	W ₁	1	27
291		Bc 5306	FR	Yffiniac, Côtes du Nord	W ₁	1	28
292		Bc 5307	FR	Tréogat, Finistère	W ₁	1	28
293		Bc 5303	FR	Tarare, Rhône	W ₁	1	28
294		Bc 5309	FR	Canteloup, Manche	W ₁	1	28
295		Bc 5310	FR	Peuméril, Finistère	W ₁	1	28
296		Bc 5311	FR	Botreux, Finistère	W ₁	1	ca 28
297		Bc 5312	FR	Tournus, Saône et Loire	W ₁	1	28
298		Bc 5313	FR	Ploumoguier, Finistère	W ₁	1	28
299		Bc 5315	FR	St. Bonnet du Chanac, 2050 ft., Lozère	W ₁	1	ca 28
300		Bc 5316	FR	Plateau de Dôme, 2700 ft., Cantal	W ₁	1	29
301		Bc 5317	FR	Ytrac, 1930 ft., Cantal	W ₁	1	28
302		Bc 5318	FR	Loc-Mélar, Finistère	W ₁	1	28
303		Bc 5319	FR	Logonna-Daoulas, Finistère	W ₁	1	28
304		Bc 5320	FR	Trizac, 3400 ft., Cantal	W ₁	1	28
305		Bc 5321	FR	Isneauville, Seine-Maritime	W ₁	1	ca 28
306		Bc 5322	FR	Lapalisse, Allier	W ₁	1	28
307		Bc 5323	FR	Lodève, Hérault	W ₁	1	28
308		Bc 5324	FR	Col de la Pierre plantée, 2930 ft., Lozère	W ₁	1	28
309		Bc 5325	FR	Col du Lauteret, 7150 ft., Hautes-Alpes	W ₁	1	28

(to be continued)

(to be continued)

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Tetraploids: <i>Dactylis glomerata</i> subsp. <i>glomerata</i> Hayek								
310		Bc 5326	FR	Billiers, Morbihan		W ₁	1	ca 28
311		Bc 5327	FR	La Charité-sur-Loire		W ₁	1	28
312		Bc 5328	FR	Valognes, Manche		W ₁	1	28
313		Bc 5352	AZ	S. Miguel		W ₁	1	ca 28
314		Bc 5353	AZ	S. Miguel, different collection		W ₁	1	28
315		Bc 5400	FR	La Hutte, N. of Le Mans on highway N. 138		W ₁	2	28
						W ₁	1	29
316		Bc 5401	FR	Druelle, near Rodez		W ₁	3	28
317		Bc 5402	FR	RAGT Experimental Farm, Rodez		W ₁	2	ca 28
318		Bc 5403	FR	As Bc 5402, but different collection		W ₁	1	ca 28
319		Bc 5404	FR	Near Agricultural College, Rodez		W ₁	2	ca 28
320		Bc 5437	IS	Rosh Pina, Upper Galilee		W ₁	3	28
321		Bc 5438	IS	Amiad, North Galilee		W ₁	3	28
322		Bc 5442	FR	12 km. S. of Entraygues		W ₁	2	28
323		Bc 5443	FR	10 km. S. of Lacroix, Barez		W ₁	3	28
324		Bc 5444	FR	3 km. N. E. of Lacroix, Barez		W ₁	3	28
325		Bc 5445	FR	4 km. N. of Laguiole, 3400 ft.		W ₁	2	28
326		Bc 5446	FR	1 km. W. of Aubrac, 4300 ft.		W ₁	1	28
327		Bc 5447	FR	Pont de Salars		W ₁	2	28
328		Bc 5448	FR	Pont de Salars, different collection		W ₁	3	ca 28
329		Bc 5449	FR	Viarouge, 3000 ft.		W ₁	3	ca 28
330		Bc 5450	FR	4.5 km. S. of Cavalerie, 2900 ft.		W ₁	3	28
331		Bc 5455	FR	8 km. W. of Apt on highway N. 100		W ₁	2	28

(to be continued)

(to be continued)

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Tetraploids: <i>Dactylis glomerata</i> subsp. <i>glomerata</i> Hayek							
332		Bc 5459	FR	10 km. N. of Sesteron on highway N. 85	W ₁	2	28
333		Bc 5460	FR	1.6 km. S. of Valenty	W ₁	3	28
334		Bc 5461	FR	6 km. E. of Tallard on highway N. 542	W ₁	2	28
335		Bc 5462	FR	Junction N. 551 and N. 542 nr. Tallard	W ₁	1	28+2B
336		Bc 5463	FR	16 km. W. of Tallard on highway N. 100	W ₁	1	28
337		Bc 5464	FR	By lake nr. Embrun, 3580 ft.	W ₁	3	28
338		Bc 5465	FR	8 km. E. of Charges, by bridge	W ₁	3	28
339		Bc 5466	FR	2.5 km. W. of Charges, on highway N. 94	W ₁	2	28
340		Bc 5467	FR	3 km. E. of Gap, on highway N. 94	W ₁	3	28
341		Bc 5468	FR	4 km. S. of Gap, on highway N. 85	W ₁	2	28
342		Bc 5469	FR	4 km. below Col de Bayard, 3100 ft.	W ₁	3	28
343		Bc 5470	FR	Col de Bayard, 4050 ft.	W ₁	3	28
344		Bc 5471	FR	Above Orcières, ca 8000 ft.	W ₁	3	28
345		Bc 5472	FR	As Bc 5471, but different collection	W ₁	3	28
346		Bc 5473	FR	End of lake near Embrun	W ₁	3	28
347		Bc 5474	FR	19 km. N. W. of Embrun, on highway N. 94	W ₁	3	28
348		Bc 5475	FR	6 km. N. W. of Briançon, 4450 ft.	W ₁	3	28
349		Bc 5477	FR	Near Vallaire, ca 4400 ft. on highway N. 202	W ₁	3	28
350		Bc 5478	FR	3 km. N. of St. Jean de Maurienne	W ₁	2	28
351		Bc 5479	FR	Junction of N. 9, 7 km. S. W. of Albertville	W ₁	1	29
352		Bc 5480	H	Lac de Genève, Les Pleiades above Vevey, 4400 ft.	W ₁	3	28

(to be continued)

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			Country	Locality			
Tetraploids: <i>Dactylis glomerata</i> subsp. <i>glomerata</i> Hayek							
353		Bc 5481	FR	21 km. N. W. of Serraville	W ₁	3	28
354		Bc 5482	IT	Bank, 300 ft., inland from Papallo	W ₁	1	ca 28
355		Bc 5486	IT	10 km. N. W. of Terni	W ₁	3	28
356		Bc 5487	IT	Bocca Trabaria, 3390 ft.	W ₁	3	28
357		Bc 5488	IT	Cortina, road to Olympic ski jump, 4200 ft.	W ₁	3	28
358		Bc 5489	IT	6 km. below Passo di Pordoi, 5850 ft.	W ₁	3	28
359		Bc 5490		Eastern Kazakhstan. Various collection in hills	W ₁	15	28
		Bc 5495	RS			1	28+2B
360		Bc 5957	SW	nr. Kågeröd, 10 km N. of Svalof	W ₁	3	28
361		Bc 5958	SW	As Bc 5757, but different collection	W ₁	2	ca 28
362		Bc 5959	SW	Lake Vättern, 8 km N. E. of Huskvarna	W ₁	3	28
363		Bc 5960	SW	Lake Vättern, 20 km N. of Huskvarna	W ₁	1	ca 28
364		Bc 5979	NO	Fossliet	W ₁	2	28
365		Bc 5981	NO	Eidfjord	W ₁	1	28
366		Bc 5983	NO	Indre Solund	W ₁	2	28
367		Bc 5984	NO	As Bc 5983, but different collection	W ₁	3	28
Tetraploids: <i>Dactylis marina</i> Borrill							
368	8349	Bc 4900	TU	Cap Serrat	W ₁	1	ca 28
369		Bc 5214	PO	Praia da roche	W ₁	1	28
370		Bc 5215	PO	Cap S. Vincent	W ₁	1	ca 28
371		Bc 5216	PO	As Bc 5215, but different population	W ₁	2	ca 28
372		Bc 5217	PO	Praia das Maças	W ₁	1	ca 28
373		Bc 5218	PO	As Bc 5217, but different collection	W ₁	1	28

(to be continued)

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Map ref. no.	FAO index no.	W. P. B. S. accession no.	Country	Site of original collection Locality	Source of material	No. of individual genotypes counted	2n =
Tetraploids: <i>Dactylis marina</i> Borrill							
374		Bc 5219	PO	As Bc 5218, but different collection	W ₁	1	ca 28
375		Bc 5221	PO	Foz d'arelio	W ₁	1	ca 28
376		Bc 5222	PO	As Bc 5221, but different collection	W ₁	1	28
Tetraploids: <i>Dactylis glomerata</i> subsp. <i>hylodes</i> Borrill							
377		Bc 5387					
		Bc 5391	MD	Rapozeira, various collections from cliffs	W ₁	13	28
378		Bc 5683	MD	Quebrados, N. facing cliff	W ₁	1 (PMC)	28
Diploids: <i>Dactylis glomerata</i> subsp. <i>lusitanica</i> Stebbins et Zohary							
379		Bc 5238	PO	Peninha, by forester's lodge	W ₁	2	14
380		Bc 5239	PO	Peninha, seaward end of Serra da Cintra	W ₁	1	14
381		Bc 5240	PO	Loures	W ₁	5	14
382		Bc 5245	PO	Pinhal do Escouto, nr Algueirão	W ₁	1	14
383		Bc 5246	PO	near Colares	W ₁	1	14
Diploids: <i>Dactylis glomerata</i> subsp. <i>woronowii</i> (Ovcinn) Stebbins et Zohary							
384		Bc 4927					
		Bc 4929	IN	Elburz Mountains, 5000 ft. 2 collections	W ₁	2	14
Diploids: <i>Dactylis glomerata</i> subsp. <i>Parthiana</i> Borrill and Parker							
385		Bc 4933 to Bc 4942					
		Bc 4944 to Bc 4947					
		Bc 4949 to Bc 4963					
		Bc 4965, Bc 4966					
		Bc 4968 to Bc 4970					
		Bc 4973, Bc 4980					

(to be continued)

Table of chromosome numbers

Map ref. no.	FAO index no.	W. P. B. S. accession no.	Site of original collection		Source of material	No. of individual genotypes counted	2n =
			Country	Locality			
Diploids: <i>Dactylis glomerata</i> subsp. <i>Parthiana</i> Borrill and Parker							
		Bc 4983, Bc 4984					
		Bc 4988, Bc 5001					
		Bc 5006, Bc 5008					
		Bc 5009, Bc 5010					
		Bc 5013, Bc 5015					
		Bc 5018	IN	Elburz Mountains, 6500 ft. Different collections in forest (<i>Quercus</i>)	W ₁	46	14
Diploids: <i>Dactylis glomerata</i> subsp. <i>judaica</i> Stebbins et Zohary							
386		Bc 5433	IS	Ephraim hills, Jezreel valley	W ₁	2	14
387		Bc 5434	IS	Jerusalem	W ₁	3	14
Diploids: <i>Dactylis glomerata</i> subsp. <i>castellata</i> Borrill and Parker							
388	3215	Bc 4664			R ₂	3	14
		Bc 4458	AL	Oued Chiffa, railway embankment	W ₁	3	14
389		Bc 5367	TU	Le Kef	W ₁	1	14+1B
						2	14
Diploids: <i>Dactylis glomerata</i> subsp. <i>lebanotica</i> Borrill and Parker							
390	5710	Bc 4800	LE	Yuntah, S. W. Anti-Liban	W ₁	24	14
391	5711	Bc 4801	LE	V'kassine, W. slopes of S. Lebanon	W ₁	37	14

Chromosome numbers of *Dactylis* species (second part). The material was derived from W. P. B. S. collections sponsored by the A. R. C., and in part from seed provided by individual collectors, and by F. A. O.

Key to symbols used in the table: AL=Algeria, AZ=Azores, EI=Eire, FR=France, Gr=Greece, H=Heletia (Switzerland), IN=Iran, IS=Israel, IT=Italy, JO=Jordan, LE=Lebanon, MD=Madeira, NO=Norway, PO=Portugal, RS=Russia, SP=Spain, SW=Sweden, TU=Tunisia.

R₂=Plants obtained by sowing at the W. P. B. S. seed harvested at Rome from open-pollinated R₁ plants. W₁=Plants obtained at the W. P. B. S. by sowing seed of the original collection.

All counts were made at metaphase I of pollen mother cell meiosis.

and *santi* (Benson 1966). The chromosomal survey has revealed a new tetraploid subsp. *hylodes* (Parker and Borrill, in preparation). This grass, which occurs on the island of Madeira, shows obvious morphological affinities (persistent, trailing perennial woody stems, leaf papillosity) to subsp. *smithii*, indigenous to the Canary Islands. Intensive collections on Madeira showed that *smithii* does not occur there. Populations similar in type, but not morphologically identical with *smithii* are known from the Cap Verde islands (herb. material). The possibility that ssp. *hylodes* may occur on islands other than Madeira needs investigating.

There is now evidence of two tetraploids with a subtropical-orientated distribution: *hylodes* very closely allied to *smithii*, and probably confined to Macaronesia, and *D. marina* having a more extended distribution in the coastal habitats of these islands, the Mediterranean, and the Atlantic coast of Portugal, north almost to Vigo.

Further collections have been examined in the diploid subspecies described by Stebbins and Zohary (1959), namely *judaica*, *lusitanica*, and *woronowii*. An extended range of counts has been made on material which, though included in the first map (1961), has now been given subspecific rank, namely *castellata* from Algeria, and *lebanotica* from the Lebanon.

An extended collection of *Dactylis* from the Elburz Mountains of N. Iran proved to be diploid (map 385) subspecies *parthiana*. This large-growing cocksfoot with temperate climate affinities occurs extensively in oak woods at the higher altitudes. Subspecies *castellata*, *lebanotica*, *parthiana* and *hylodes* are being described by Parker and Borrill.

Areas of contact between dissimilar geographical subspecies, and between diploids and tetraploids have been found during this survey. Both these situations are of interest. Hybridization between somewhat dissimilar, but more or less interfertile, geographical diploids, followed by chromosome doubling, has been postulated as the mode of origin of the tetraploids, many of which combine the characteristics of two or more diploid subspecies (Jones, Borrill and Carroll 1961). The best documented example of contact between diploids occurs in the Elburz range. Subspecies *woronowii* was found on dry, base-rich limestone outcrops in open thorn scrub at about 5000 ft. With increasing altitude a zone containing hybrid plants was found, followed by *Quercus* woodland, in which subsp. *parthiana* was a major component of the ground flora. These woodlands, at up to 6500 ft, were more humid, receiving precipitation from low cloud and mist even in the summer.

Contact between diploid and tetraploid (subsp. *hispanica*) in natural habitats has been found on several occasions: subsp. *lusitanica* at Loures, Portugal (map 381, 231), subsp. *castellata* at Oued Chiffa, Algeria (map 17, 1961), subsp. *lebanotica* at Yuntah and Vkassine, Lebanon (map. 390, 391, 224; map 98, 99, 1961), and subsp. *judaica* at Safad, Galilee (map 215, 1961). In the latter locality some 2000 plants in two contact areas were screened to find individuals with non-dehiscent anthers (a characteristic of triploid *Dactylis*).

Out of 24 such plants with chromosomes counted, seven were found to be triploid (Zohary and Nur 1959).

No triploids have been found amongst the seedling progeny of diploid and tetraploid plants sampled at the other localities, though a deliberate search in the actual habitats might well have discovered some. These areas of diploid/tetraploid contact are of importance because of the opportunities for enrichment of the tetraploids by genes from the diploid. The triploids act as a one way bridge for gene flow from diploid to tetraploid (Zohary and Nur 1958, Jones and Borrill 1962).

Further investigation shows that, over a range of experimental reciprocal crosses between diploid and tetraploid *Dactylis*, tetraploid hybrid progeny were produced in numbers equalling the triploids (Carroll and Borrill 1965). Such tetraploid hybrids have a regular meiosis and normal fertility. No doubt, hybrids formed in this way were present in the contact areas sampled by Zohary and Nur, but were not discovered because of the prescreening practised for anther sterility. Indeed, in this area, where both chromosome races were morphologically very similar, tetraploid hybrids could have been identified positively only amongst the progeny of diploid female parents. The genetics and possible modes of origin of such tetraploid hybrids have been considered in detail in an earlier publication (Carroll and Borrill *loc. cit.*). Viewed on an evolutionary time-scale, the possibilities of gene-flow from the diploid to the tetraploid level via fertile F_1 hybrids are considerable. The capacity for forming tetraploid as well as triploid hybrids represents an important increase in genetic versatility in the genus. By such crosses the complex hybridity often found in wild tetraploid *Dactylis* could be supported and extended. *Dactylis* is now chromosomally very well documented, and all the levels of polyploidy which exist have probably been found. The distribution of diploids and tetraploids in particular areas would justify further study, on the one hand amongst the subtropical forms of Macaronesia, and on the other in contact regions such as N. Africa and N. Iran.

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