Appendix to R.R.Traill's "How Popperisn positivism killed a good-but-poorly-presented theory — Insect Communication by Infrared"

A more readable version of its Table 4.1:

Catalogue and summary of evidence-and-assertions relating to the 1977 debate between M.Diesendorf and P.S.Callahan

#	y ı	mn	Description	sub	ext	nr	far	#2	References and sources
2	H <	<ch< td=""><td>We should distinguish 3 range-zones for any possible chemical olfaction:</td><td></td><td></td><td>9</td><td></td><td>2</td><td>from standard Dipole Theory</td></ch<>	We should distinguish 3 range-zones for any possible chemical olfaction:			9		2	from standard Dipole Theory
			(A) Contact mol/ receptor; (B) " Dipole-near " (<50nm?); (C) " Dipole-far " (>50nm)						
7	H I	ky2	(Almost) all insect "knobs" are lock&key contact-detectors for scent-molecules			9=		7	Kettlewell; /*\326c2"fit"
8	H I	ky1	Some insect "knobs" are lock&key contact-detectors for scent-molecules			9=		8	
9	H	ky0	(Almost) no insect "knobs" are lock&key contact-detectors for scent-molecules			9=		9	
10	<u>E</u> k	ky=	The immune system uses molecular lock&key contact-detectors for identification; (xyz)			9		10	well known
11	H s	sAx	Any contact(A)-discrimination* between scents depends on molecule geometry (<i>xyz</i>) *See #2 and its nearness-categories A,B,C			9		11	(i)
12	H s	sВx	Some dipole-near(B)-discrimination* between scents depends on molecule geometry (<i>xyz</i>) *See #2 and its nearness-categories A,B,C			9		12	Short-range only
13	Hs	sBt	Some dipole-near(B)-discriminatn between scents depends on electromagnetic <i>time-patterns</i> from the scent molecules (<i>t</i>)			9		13	(not discussed further here)
14	Hs	sCt	Any dipole-far(C)-discrimination between scents depends on electromagnetic <i>time-patterns</i> from the scent molecules (<i>t</i>)			9		14	
20	Н	el:	Insect cuticle is capable of forming electrets			5		20	/*\p319
23	Ε¢	ecg	E.coli uses a d/dt gradient to find a near target			9		23	Alberts et al,(1983), p758
33	A d	Ś	For "far" dipole-range $(d>\lambda)$, phase patterns are const with respect to <i>time</i> , so <i>d</i> "makes no difference"			9		33	/C3 \115.1
34	A o	d <t< td=""><td>For "near" dipole-range (d<<λ), phase patterns are different, NOT absent as Diesendorf, /D2\109.3 implies</td><td></td><td></td><td>9</td><td></td><td>34</td><td>NEW</td></t<>	For "near" dipole-range (d<<λ), phase patterns are different , NOT absent as Diesendorf, /D2\109.3 implies			9		34	NEW
44	E	dir	Wolf Spider points spines toward target			9		44	/*\p325, fig.14
46	Е	irr	Moths have irridescence etc for IR frequencies			9		46	/*\p330
49	E q	ļm0	Some scent-atom/molec will start with excitation energy when they leave target [but ephemeral]			9		49	/*\p333c2.9
52	Ε¢	ik∼	Wolf Spider finds prey or mate in total darkness (with respect to visible light), & without any antennae			9		52	/*\p326, /t\p133
57	A r	# nm	Irrelevant here: how mammalian olfaction operates			5		57	/*\p341c2.3
59	E	fla	Moths follow pheromone long-range, but then candle-flame at short-range			9		59	/*\p343c1.4, (Fabre,1913; Shorey&Gaston, 1965)
61	A	flc	"radiation-pumping" of molecules can mislead closeup (especially near Humans), so alternatives could help			9		61	
62	E	fld	Despite the case for closeup homing via "2 & 3", insects <i>are</i> still misled — as if using "1" alone			9		62	Fabre
63	H	fl2	Use of close-up homing-method 2: "normal" incoherent-light-or-IR vision —			9		63	common assumption
64	H	fl3	Use of close-up homing-method 3: traditional <u>olfaction via concentration-gradient</u> (perhaps via some roundabout effect)			9		64	/t\p187
65	A c	cgl	Insect's sensing of concentration-gradient is by d/dx: comparing 2+ sensors simultaneously;			9		65	common assumption
66	A c	cg2	Insect's sensing of concentration-gradient is by d/dt: remembering + retesting — like chemotaxis in Escherichia coli bacteria			9		66	Alberts et al (1983), pp575-579
67	A c	cg3	Insect's sensing of concentration is by the frequency of its nearby stimulated emission;			9		67	/t\p187,fig.20
79	Еı	mir	Mirror-walls \rightarrow increased mating-rate;			9		79	/*\p343c2, /t\p152
80	EI	leg	RatMites detect IR (incl. specif. freqs) via setae spines on front leg-tarsals			9		80	Bruce (1971 jul)
82	Еr	mol	Enantiomeric (opt.isomer) forms of scent molecs → different responses after conditioning to one of them — in locust & bee — cit./D2\p108.4 (#logic!)			9		82	Kafka+3(1973) ^{JCompPhio87,277;+(1971?)}
83	E (odi	Circumstantial evidence favouring contact-mechanisms for odour detection in insects, eg template "lock-&-key" fit for specific molecules			9		83	Kaissling (1971)
84	E d A	odm	Evidence (incl elimination) favouring contact-mechanisms for odour detection in <i>mammals</i> , eg template "lock-&-key" fit for specific molecules			9		84	Altner&Prillinger (1980), Davies (1971), Beets(1971)

#	ty	mn	Description	sub	ext	nr	far	#2	References
3	Н	ae2	All (or nearly all) insect innervated "knobs" & pits are electromagnetic aerials (capable of	b+		5=	9=	3	Callahan
			time-pattern discrimination, like TV)						(ii)
4	н	ae1	Some insect innervated "knobs" & pits are electromagnetic aerials (capable of <i>time-pattern</i> discrimination like TV)	b+		5=	9=	4	Callahan Long-range;
6	F	ae=	TV, radio, radar, etc have "knobs" which serve as electromagnetic aerials capable of	b		5	9	6	(may apply to short-range also)
15	A	bod	ume-pattern discrimination	a.		5	5	15	Laithwaite (1960 Jul): critic/0\34.7
16	н	bwi	Any "bod"(15) ID signal is modulated (made discriminable) by time code of wing flaps etc.	a. a.		5	5	15	Callaban (1965a)
			[<i>t</i> -code]						
1/	Б	ant	Whole antenna could theoretically act as an aerial for FIR (20-200µm);	D h		9	9	17	Laithwaite (1960 Jul)
18	Г	off	Whole antenna is like a military "fishbone" aerial array for radar;	b		5	9	18	Laithwaite (1960 Jul)
19	E	fab	Signal "switched off" soon after mating;	a			9	19	Laithwaite (1960 Jul)
22	E	nit	far detection is possible (when no scent molecules could be reaching the receptor)	a		0	9	22	Fabre, Laithwaite
24	Ē	nir	Grant's pits have geometry compatible with their being electromagnetic aerials;	0∓ b±		9 0	9	24	Grant (1949)
25	A	pi=	Grant's pits: size is such that, if aerials, they are appropriate for its reception	b+		9	9	25	(1949) (*)p128 Cropt (1040)
20	Н	phm	Grant's pits seen as aerial types	a+		- 9	9	20	/*\p138, Grant (1949)
27	A	+sp	Some (discriminable) it signals come from mere black body grantaneous amissing	al		- 9	9	21	/D0\42.3
20			[denied by Diesendorf]	u.		ĺ		20	/D0/42-5
29	A	+bo	Energy-supply for any pheremone IR signals must be adequate & sustainable (≈ 15)	a.		9	9	29	/D0\44+
30	A	+ru	Some Energy for pheremone IR signals from rubbing;	с		5	9	30	/C3\p113.38: Q: /D2?\107.1
31	F	+fl	Some Energy for pheremone IR signals via fluorescence ex blue/UV/; ≈ 60	a:		9	9	31	/C3\p113.38: Q: /D2?\107.1
32	A	peg	Grant's "peg" = pit-sensilla, well-placed to "fire" dendrite; → action-potential spike (or TEM mode fibre-optic signal! — NEW)	b		9	9	32	Diesendorf:/D0\36.8, Grant, NEW
36	E	rub	Insect is "constantly rubbing" especially in humid conditions [This "must have some meaning"]	с		9	8	36	/C3\p112.2
37	E	vib	Oft-seen "vibrations" of antennae [These "must have some meaning"]	c		9	8	37	$/C3 \times 112.2 - + (C/* \times 321c1 > 1965b^{AnESAm58:159-69})$
38	A	oft	Oft-seen behaviour or bio-structures must have significance (else eliminated by evolution)	с		9	8	38	/C3\p112.2
39	Н	spi	Assume any IR reception → response via action-potential "spike" "[A]"	b^		9	9	39	physiologists' standard assumption
40	E	sp#	Seems: No reported direct evidence that <u>IR</u> →action potential spikes — [yet Callahan did find such spikes for <u>visible</u> light ("gating": see "spL" (#94)).]	b^		5	5	40	Callahan(1968)p1425-; Hsiao('72), Diesendorf
41	F	key	Consistent phase-control could serve as callsign ID, different from noise & other signals	a`		9	9	41	/*\p343c1.2 (implied)
42	E	gel	tapering & other geometry of macro dielectric aerial \rightarrow match impedance free space [engineering] ≈ 43	b.		9	9	42	/*\p323c2
43	E	ge2	tapering & other geometry of (micro) dielectric insect spines \leftrightarrow macro dielectric \approx 42	b.		9	9	43	/*\
45	E	win	Atmos windows for IR match corneal lens transmission windows	d/			9	45	/*\p338-9
47	Е	amp	"Maser-like" Stimulated-emission can \rightarrow amplification	a^		9	9	47	/*\p331
48	E	tow	Maser-like Stimulated-emission is very common in IR \rightarrow amplification	a^		9	9	48	/*\p333c1; Townes(1965) ^{Sci149} p837
50	F	co/	optical "coherence" can be partial	a`		9	9	50	/*\p334c2.9
51	F	co^	partial "coherence" can, in principle, suffice to override random background noise	a`		9	9	51	/*\p334c2.9
53	A	drx	Molecules do act as dipole aerials — (Townes, 1965; Drexhage, 1970)	d:		9	9	53	/*\p335c1.7; Drexhage (1970)
54	A	dco	Human retinal cones may well serve as dipole aerials — [eye oscillation — NB]	d:		9	9	54	Myers (1965) /*\p342c2.4
56	E	eyI	Corneal lens is an "eye" for incoherent IR — & better than the bee-eye (for visible & UV)	di		9	5	56	/*\p338c2
60	Н	flb	IR attraction operates via "radiation-pumped molecules" — (method "1": $_{RRT}$) ≈ 31	a:		9	9	60	/*\p343c2.2
68	н	cg#	Frequency of the target-female's pheromone IR emission indicates its concentration, hence how near it is. Could aid targeting.	a		5	5	68	/t\p189
69	F	c~3	The concentration of a scent affects the frequency of its stimulated emission;	a		9	9	69	/*\p175-7, 187, 211
70	A	t&e	Spines can have dual roles: tactile AND electromagnetic	b		9	8	70	/*\p342c2.8
71	F	ir^	Ambient IR remains abundant at night	а		9	9	71	/*\p344 (eg)
72	A	irS	Ambient (incoherent?) short-wave-IR offers source of pumping-energy	а		9	9	72	Callahan
73	Н	irL	Ambient (incoherent) longer -wave-IR constitutes noise which will kill the needed signals. [NEG]	a`		9	9	73	Diesendorf
74	Е	irH	Rising Relative-Humidity increasingly kills off IR signals	d/		9	9	74	/*\p336
75	E	ir#	At High Relative-Humidity, insect mating etc fails to occur	d/		9	9	75	/*\p339c2.4
76	E	ir/	At High Relative-Humidity, arthropods spend much time wiping antennae etc (even to exhaustion)	d/		9	9	76	/*\p339c2.8

78	E	u&s	Strong interaction effects increase the mating-rate, [eg. UV <u>PLUS</u> pheromone-scent — see "u:=" (95)];	a+		9	9	78	/t\p149-162 (e.g.)
81	F	las	VisibleLight: Laser efficiency in producing action-potential "spikes" in nerves >> mere mixed-phase monochrome efficiency (by 42×),	a^		5	5	81	Callahan (1968) ^{ApplOpt7:1425-30} Bruce(1971) ^{AnESAm64:925-31}
86	н	sp~	IR reception can be conveyed direct to the dendrite <u>as</u> natural IR, (without needing any "spike"); — then conducted on dendrite surface [RRT] "[R]"	b^		9	9	86	NEW; Schriever(1920)
88	Е	res	IR \rightarrow measurable response (whatever the route)	di		5	9	88	Callahan
89	E	nat	Natural coherence (phase correlation), eg for expts in Fresnel's day	a`		9	9	89	NEW (in this context)
90	A	dst	Geometry, frequency, & phase distributions (or cloud emission) — "bullseye" model	a+			9	90	NEW
91	F	cld	Female moths & food crops → pheromones or other chem "odours" — but which may also have significant IR-optical properties	a+		5	9	91	Callahan etc
92	F	wvg	Time-pattern information capture from macro-waveguide \rightarrow TV demodulation etc	b			9	92	well known
93	F	mye	Time-pattern information capture from myelin segment \rightarrow molecular demodulation?	b			9	93	Traill (2005b)
94	F	spL	Callahan did find action-potl. spikes for visible light ("gating" the IR reception throughout	b		5	5	94	Callahan(1968)p1425-; Hsiao('72),
			the antenna). — [but apparently no spikes from IR itself]						Diesendorf
95	н	u:=	UV <u>PLUS</u> pheromone-scent \rightarrow IR through fluorescence;	a+		9	9	95	/t\p149-162 (e.g.)
			[& this IR is what increases the mating rate]						
#	ty	mn	Description	sub	ext	nr	far	#2	References
# 77	ty H	mn coh	Description For Callahan (/*\p316+) (& perhaps Groner, his source?), "coherence" actually means "consistent phase-control"	sub	ext D	nr	far	#2 77	References NEW
# 77 35	ty H	mn coh d <x< td=""><td>Description For Callahan (/*\p316+) (& perhaps Groner, his source?), "coherence" actually means "consistent phase-control" Diesendorf /D4\125.2 "then<u>molecular structure</u>"[xyz]; anyhow "<u>sensilla shapes</u> become irrelevant toolfaction" <u>cf</u>.array</td><td>sub</td><td>ext D F</td><td>nr</td><td>far ?</td><td>#2 77 35</td><td>References NEW NEW: see Amoore (1971), etc.</td></x<>	Description For Callahan (/*\p316+) (& perhaps Groner, his source?), "coherence" actually means "consistent phase-control" Diesendorf /D4\125.2 "then <u>molecular structure</u> "[xyz]; anyhow " <u>sensilla shapes</u> become irrelevant toolfaction" <u>cf</u> .array	sub	ext D F	nr	far ?	#2 77 35	References NEW NEW: see Amoore (1971), etc.
# 77 35 21	ty H A H	mn coh d <x elt</x 	Description For Callahan (/*\p316+) (& perhaps Groner, his source?), "coherence" actually means "consistent phase-control" Diesendorf /D4\125.2 "then <u>molecular structure</u> "[xyz]; anyhow " <u>sensilla shapes</u> become irrelevant toolfaction" <u>cf</u> .array Electrets might serve as memory elements (& collectively: like a Lamarckian tape-recorder)	sub	ext D F L	nr	far ?	#2 77 35 21	References NEW NEW: see Amoore (1971), etc. /*\p341c2.6
# 777 355 211 855	ty H A H	mn coh d <x elt emp</x 	Description For Callahan (/*\p316+) (& perhaps Groner, his source?), "coherence" actually means "consistent phase-control" Diesendorf /D4\125.2 "thenmolecular structure"[xyz]; anyhow "sensilla shapes become irrelevant toolfaction" <u>cf</u> .array Electrets might serve as memory elements (& collectively: like a Lamarckian tape-recorder) Proof of C's ae(1 or 2 — idea of A→IR→Z) requiress positively demonstrating IR→Z in absence of A. [Empirical insistence]	sub	ext D F L M	nr - -	far ? -	#2 77 35 21 85	References NEW NEW: see Amoore (1971), etc. /*\p341c2.6 /D2\p106.6, 106.7
# 777 355 211 855 1	ty H A H A	mn coh d <x elt emp</x 	Description For Callahan (/*\p316+) (& perhaps Groner, his source?), "coherence" actually means "consistent phase-control" Diesendorf /D4\125.2 "thenmolecular structure"[xyz]; anyhow "sensilla shapes become irrelevant toolfaction" <u>cf</u> .array Electrets might serve as memory elements (& collectively: like a Lamarckian tape-recorder) Proof of C's ae(1 or 2 — idea of A→IR→Z) requiress positively demonstrating IR→Z in absence of A. [Empirical insistence] We should distinguish Laithwaite's 2 target-range-zones: near (<100yds), far (>=100yds)	sub	ext D F L M	nr - -	far ? - *	#2 777 355 21 855	References NEW NEW: see Amoore (1971), etc. /*\p341c2.6 /D2\p106.6, 106.7 Laithwaite (1960)
# 777 355 21 855 1 555	ty H A H A E	mn coh d <x elt emp <yd wHi</yd </x 	Description For Callahan (/*\p316+) (& perhaps Groner, his source?), "coherence" actually means "consistent phase-control" Diesendorf /D4\125.2 "thenmolecular structure"[xyz]; anyhow "sensilla shapes become irrelevant toolfaction" cf.array Electrets might serve as memory elements (& collectively: like a Lamarckian tape-recorder) Proof of C's ae(1 or 2 — idea of A→IR→Z) requiress positively demonstrating IR→Z in absence of A. [Empirical insistence] We should distinguish Laithwaite's 2 target-range-zones: near (<100yds), far (>=100yds) High relative.humidity blocks IR	sub	ext D F L M M X	nr - -	far ? - *	#2 77 35 21 85 1 55	References NEW NEW: see Amoore (1971), etc. /*\p341c2.6 /D2\p106.6, 106.7 Laithwaite (1960) /*\p336
# 777 355 211 855 1 555	ty H A H A E	mn coh d <x elt emp <yd wHi</yd </x 	Description For Callahan (/*\p316+) (& perhaps Groner, his source?), "coherence" actually means "consistent phase-control" Diesendorf /D4\125.2 "thenmolecular structure"[xyz]; anyhow "sensilla shapes become irrelevant toolfaction" cf.array Electrets might serve as memory elements (& collectively: like a Lamarckian tape-recorder) Proof of C's ae(1 or 2 — idea of A→1R→Z) requiress positively demonstrating IR→Z in absence of A. [Empirical insistence] We should distinguish Laithwaite's 2 target-range-zones: near (<100yds), far (>=100yds) High relative.humidity blocks IR Duplicates irH (74) qv	sub	ext D F L M M X	*	far ? - *	#2 77 35 21 85 1 55	References NEW NEW: see Amoore (1971), etc. /*\p341c2.6 /D2\p106.6, 106.7 Laithwaite (1960) /*\p336 /#\p336 (iii) Metascience.
# 777 355 211 855 1 555 877	ty H A H E E	mn coh d <x elt emp <yd wHi lip</yd </x 	Description For Callahan (/*\p316+) (& perhaps Groner, his source?), "coherence" actually means "consistent phase-control" Diesendorf /D4\125.2 "thenmolecular structure"[xyz]; anyhow "sensilla shapes become irrelevant toolfaction" <u>cf</u> .array Electrets might serve as memory elements (& collectively: like a Lamarckian tape-recorder) Proof of C's ae(1 or 2 — idea of A→IR→Z) requiress positively demonstrating IR→Z in absence of A. [Empirical insistence] We should distinguish Laithwaite's 2 target-range-zones: near (<100yds), far (>=100yds) High relative.humidity blocks IR Duplicates irH (74) qv IR signals (as such) may travel along dendrites, thus obviating any need for Action potential spikes (& explaining why C didn't find them); Dupl 86	sub	ext D F L M X X	nr *	far ? - *	#2 777 355 211 855 1 555 87	References NEW NEW: see Amoore (1971), etc. /*\p341c2.6 /D2\p106.6, 106.7 Laithwaite (1960) /*\p336 Metascience, remarks & dupl ⁿ . (some are tacitly used
# 777 355 211 855 1 555 877 58	H A A H E E A	mn coh d <x elt emp <yd wHi lip</yd </x 	Description For Callahan (/*\p316+) (& perhaps Groner, his source?), "coherence" actually means "consistent phase-control" Diesendorf /D4\125.2 "thenmolecular structure"[xyz]; anyhow "sensilla shapes become irrelevant toolfaction" <u>cf</u> .array Electrets might serve as memory elements (& collectively: like a Lamarckian tape-recorder) Proof of C's ae(1 or 2 — idea of A→1R→Z) requiress positively demonstrating IR→Z in absence of A. [Empirical insistence] We should distinguish Laithwaite's 2 target-range-zones: near (<100yds), far (>=100yds) High relative.humidity blocks IR Duplicates irH (74) qv IR signals (as such) may travel along dendrites, thus obviating any need for Action potential spikes (& explaining why C didn't find them); Dupl 86 Irrelevant here: What happens when directly-destructive intensities are used?	sub	ext D F M M X X X	nr - - *	far ? - *	#2 77 35 21 85 1 55 87 58	References NEW NEW: see Amoore (1971), etc. /*\p341c2.6 /D2\p106.6, 106.7 Laithwaite (1960) /*\p336 /#\p341c2.4 Metascience, remarks & dupl ⁿ . (some are tacitly used in the text here)

Main References

and their abbreviations

- Callahan, P.S. (1967) "Insect molecular bioelectronics: A theoretical and experimental study of insect sensillae as tubular waveguides, with particular emphasis on their dielectric and thermoelectret properties". *Miscellaneous Publications of the Entomological Society of America* 5(7), 313-347. "/*/"
- Callahan, P.S. (1975) "Insect antennae with special reference to the mechanism of scent detection and the evolution of the sensilla" *International J. Insect Morphol. and Embryol.* **4**(5), 381-430. "/**C1**\"
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- Diesendorf, M., G.Stange, and A.W.Snyder (1974) "A theoretical investigation of radiation mechanisms of insect chemoreception" *Proceedings of the Royal Society of London, B*, **185**, 33-49. "/**DO**\"
- Laithwaite, E.R. (1960) "Radiation Theory for the Assembling of Moths". *The Entomologist*. **93**(1165 June), 113-7, and **93**(1166 July), 133-7, +plate.

[PTO for the same table sorted differently:

 $Page \; A4 \; {}_{(of \; 8)}$

The Same Table re-sorted back into numerical order of its "#" labels (with a loose attempt to group like with like)

# 1	y mn	Description	sub	ext	nr	far	#2	References and sources
1	H <yo< td=""><td>We should distinguish Laithwaite's 2 target-range-zones: near (<100yds), far (>=100yds)</td><td></td><td>Μ</td><td>*</td><td>*</td><td>1</td><td>Laithwaite (1960)</td></yo<>	We should distinguish Laithwaite's 2 target-range-zones: near (<100yds), far (>=100yds)		Μ	*	*	1	Laithwaite (1960)
2	H <ch< td=""><td>We should distinguish 3 range-zones for any possible chemical olfaction:</td><td></td><td></td><td>9</td><td></td><td>2</td><td>from standard Dipole Theory</td></ch<>	We should distinguish 3 range-zones for any possible chemical olfaction:			9		2	from standard Dipole Theory
		(A) Contact mol/ receptor; (B) " Dipole-near " (<50nm?);						
-	1 001	(C) "Dipole-far" (>50nm)	b 1		5	0-		
3	ac2	All (or nearly all) insect innervated "knobs" & pits are electromagnetic aerials (capable of time-nattern discrimination like TV)	0+		5=	2-	3	Callahan
4	H ael	Some insect innervated "knobs" & pits are electromagnetic aerials (capable of <i>time-pattern</i>	b+		5=	9=	4	Callahan
		discrimination, like TV)						Cananan
6	F ae=	TV, radio, radar, etc have "knobs" which serve as electromagnetic aerials capable of	b		5	9	6	well known
		time-pattern discrimination						
7	H ky2	(Almost) all insect "knobs" are lock&key contact-detectors for scent-molecules			9=		7	Kettlewell; /*\326c2"fit"
8	H kyl	Some insect "knobs" are lock&key contact-detectors for scent-molecules			9=		8	
9	H ky((Almost) no insect "knobs" are lock&key contact-detectors for scent-molecules			9=		9	
10	E ky=	The immune system uses molecular lock&key contact-detectors for identification; (xyz)			9		10	well known
11	H sA	Any contact(A)-discrimination* between scents depends on molecule geometry (xyz)			9		11	
		*See #2 and its nearness-categories A,B,C						
12	H sB	Some dipole-near(B)-discrimination* between scents depends on molecule geometry (xyz)			9		12	
12	-I eBt	*See #2 and its nearness-categories A,B,C			0		10	-
15		Some dipole-near(B)-discrimination between scents depends on electromagnetic time-patterns from the scent molecules (t)			,		13	
14	H sCt	Any dipole-far(C)-discrimination between scents depends on electromagnetic <i>time-natterns</i>			9		14	-
		from the scent molecules (<i>t</i>)						
15	A boo	Some (discriminable) IR signals come from the target's body heat; (≈29)	a.		5	5	15	Laithwaite (1960 Jul); critic/0\34.7
16	H bwi	Any "bod"(15) IR signal is modulated (made discriminable) by time-code of wing-flaps etc;	a.		5	5	16	Callahan (1965a,)
		[t-code]						
17	H ant	Whole antenna could theoretically act as an aerial for FIR (20-200µm);	b		9	9	17	Laithwaite (1960 Jul)
18	F +++	Whole antenna is like a military "fishbone" aerial array for radar;	b		5	9	18	Laithwaite (1960 Jul)
19	E off	Signal "switched off" soon after mating;	a			9	19	Laithwaite (1960 Jul)
20	H el:	Insect cuticle is capable of forming electrets			5		20	/*\p319
21	Helt	Electrets might serve as memory elements (& collectively: like a Lamarckian tape-recorder)		L	I.	1	21	/*\p341c2.6
22	E fab	far detection is possible (when no scent molecules could be reaching the receptor)	а			9	22	Fabre, Laithwaite
23	E ecg	<i>E.coli</i> uses a <i>d/dt</i> gradient to find a near target			9		23	Alberts et al,(1983), p758
24	E pit	Grant's pits have geometry compatible with their being electromagnetic aerials;	b+		9	9	24	Grant (1949)
25	E pir	Grant's pits: size is such that, if aerials, they are appropriate for IR reception	b+		9	9	25	Grant (1949)
26	A pi=	Grant's pits seen as aerial types	b+		9	9	26	/*\p138, Grant (1949)
27	H phn	Some (discriminable) IR signals come from pheremone molecules;	a+		9	9	27	Diesendorf:/D0\34.7
28	A +sp	Energy for pheremone IR signals can come from mere black-body spontaneous emissn;	a!		9	9	28	/D0\42-3
20	A +br	[denied by Diesendorf]			0	9	20	(D0) 44 -
30	A +r	Energy-supply for any pheremone IK signals must be adequate & sustainable (≈ 15)	а. С		5	í 9	29	$(D0)^{44+}$
21	F +fl	Some Energy for pheremone IR signals from rubbing;	с 0:		5	ý 9	30	/C3\p113.38: Q: /D2/\107.1
22	A neg	Some Energy for pheremone IR signals via fluorescence ex blue/U v/; ≈ 60	a. b		9	9	31	$C_{3}(p) = 1 + C_{2}(p) + C_{3}(p) + C_{3}$
52	, pee	Grant's peg = pit-sensilia, well-placed to Tire dendrite; \rightarrow action-potential spike (or TEM mode fibre-optic signal! — NEW)	U		,	-	32	Diesendorf:/D0\36.8, Grant, NEW
33	A d>>	For "far" dipole-range $(d > \lambda)$, phase patterns are const with respect to <i>time</i> ,			9		33	/C3\115.1
		so d "makes no difference"						
34	A d<	For "near" dipole-range (d<<λ), phase patterns are different , NOT absent as Diesendorf, /D2\109.3 implies			9		34	NEW
35	A d<>	Diesendorf /D4\125.2 "then <u>molecular struct</u> ure"[xyz]; anyhow "sensilla shapes become		F	-	?	35	NEW: see Amoore (1971), etc.
		irrelevant toolfaction" <u>cf</u> .array					L	
36	E rub	Insect is "constantly rubbing" especially in humid conditions [This "must have some	c		9	8	36	/C3\p112.2
\square		meaning"]			L			1
37	= vib	Oft-seen "vibrations" of antennae [These "must have some meaning"]	с		9	8	37	$/C3 \times 112.2 - + (C/* \times 321c1)$
20	A of		6		0	8	20	(C2)=112.2
39	. 01	On-seen benaviour or bio-structures must have significance (else eliminated by evolution)	C		7	0	38	/C3\p112.2

39	H	spi	Assume any IR reception → response via action-potential "spike" "[A]"	b^		9	9	39	physiologists' standard assumption
40	E s	sp#	Seems: No reported direct evidence that <u>IR</u> →action potential spikes — [yet Callahan did find such spikes for <i>visible</i> light ("gating": see "spL" (#94)).]	b^		5	5	40	Callahan(1968)p1425-; Hsiao('72), Diesendorf
41	Fk	key	Consistent phase-control could serve as callsign ID, different from noise & other signals	a`		9	9	41	/*\p343c1.2 (implied)
42	Εg	ge l	tapering & other geometry of macro dielectric aerial \rightarrow match impedance free space	b.		9	9	42	/*\p323c2
			[engineering] ≈ 43						
43	Εg	ge2	tapering & other geometry of (micro) dielectric insect spines \leftrightarrow macro dielectric \approx 42	b.		9	9	43	/*\
44	E	dir	Wolf Spider points spines toward target			9		44	/*\p325, fig.14
45	Εv	win	Atmos windows for IR match corneal lens transmission windows	d/			9	45	/*\p338-9
46	E	irr	Moths have irridescence etc for IR frequencies			9		46	/*\p330
47	Ea	mp	"Maser-like" Stimulated-emission can \rightarrow amplification	a^		9	9	47	/*\p331
48	Et	ow	Maser-like Stimulated-emission is very common in IR \rightarrow amplification	a^		9	9	48	/*\p333c1; Townes(1965) ^{Sci149} p837
49	Eq	lm0	Some scent-atom/molec will start with excitation energy when they leave target [but ephemeral]			9		49	/*\p333c2.9
50	F	co/	optical "coherence" can be partial	a`		9	9	50	/*\p334c2.9
51	Fc	20^	partial "coherence" can, in principle, suffice to override random background noise	a`		9	9	51	/*\p334c2.9
52	E d	ik~	Wolf Spider finds prey or mate in total darkness (with respect to visible light), & without any antennae			9		52	/*\p326, /t\p133
53	A	drx	Molecules do act as dipole aerials — (Townes, 1965; Drexhage, 1970)	d:		9	9	53	/*\p335c1.7; Drexhage (1970)
54	Ac	dco	Human retinal cones may well serve as dipole aerials — [eye oscillation — NB]	d:		9	9	54	Myers (1965) /*\p342c2.4
	F				V				
55	Εv	vHı	High relative humidity blocks IR		х			55	/*\p336
56	Ε¢	evI	Duplicates III (74) qv	di		9	5	56	(*)=228=2
57	A	#	Conteal tens is an eye for incontent in $\mathbb{R} \to \infty$ better than the bee-eye (for visible $\& \cup V$)	u		5	-	57	/*\p558c2
57	n	nm	Infelevant here. now manimular offaction operates		N	5	6	51	/*\p341c2.5
58	A #	ŦZZ	Irrelevant here: What happens when directly-destructive intensities are used?		х	5	2	58	/*\p341c2.4
59	E	па	Moths follow pheromone long-range, but then candle-flame at short-range			9		59	/*\p343c1.4, (Fabre, 1913;
60	H	flb	IR attraction operates via "radiation-numped molecules" — (method "1": ppr)	a:		9	9	60	/*\n343c2 2
			≈ 31						1 404302.2
61	A	flc	"radiation-pumping" of molecules can mislead closeup (especially near Humans), so alternatives could help			9		61	
62	E	fld	Despite the case for closeup homing via "2 & 3", insects <i>are</i> still misled — as if using "1" alone			9		62	Fabre
63	H 1	f12	Use of close-up homing-method 2: "normal" incoherent-light-or-IR vision —			9		63	common assumption
64	H 1	f13	Use of close-up homing-method 3: traditional olfaction via concentration-gradient (perhaps			9		64	/t\p187
			via some roundabout effect)						
65	Ac	:g1	Insect's sensing of concentration-gradient is by d/dx: comparing 2+ sensors simultaneously;			9		65	common assumption
66	A c	cg2	Insect's sensing of concentration-gradient is by d/dt: remembering + retesting — like chemotaxis in Escherichia coli bacteria			9		66	Alberts et al (1983), pp575-579
67	A c	2g3	Insect's sensing of concentration is by the frequency of its nearby stimulated emission;			9		67	/t\p187,fig.20
68	H c	cg#	Frequency of the target-female's pheromone IR emission indicates its concentration, hence	a		5	5	68	/t\p189
	_	-	how near it is. Could aid targeting.			_	0		
69 50	F C	2~3	The concentration of a scent affects the frequency of its stimulated emission;	a		9	9	69	/*\p175-7, 187, 211
70	At	æe	Spines can have dual roles: tactile AND electromagnetic	b		9	8	70	/*\p342c2.8
71	F 1	ir^	Ambient IR remains abundant at night	а		9	9	71	/*\p344 (eg)
72	A	irs	Ambient (incoherent?) short-wave-IR offers source of pumping-energy	a		9	9	72	Callahan
73	н	IrL	Ambient (incoherent) longer-wave-IR constitutes noise which will kill the needed signals.	а		9	9	73	Diesendorf
74	Ei	irH	[NEO] Dising Delative Humidity increasingly kills off ID signals	d/		9	9	74	/*\n336
75	E i	ir#	At High Relative-Humidity insect mating etc fails to occur	d/		9	9	75	/*\n339c2 4
76	E	ir/	At High Relative-Humidity, arthropods spend much time wining antennae etc (and the structure)	d/		9	9	76	/*\p339c2.8
77	H c	coh	For Callaban (/*\n316+) (& nerbans Groner, his source?), "coherence" actually means		D	+	-	77	NFW
			"consistent phase-control"						
78	E u	ı&s	Strong interaction effects increase the mating-rate,	a+	ł	9	9	78	/t\p149-162 (e.g.)
			[eg. UV <u>PLUS</u> pheromone-scent — see "u:=" (95)];						_
79	Er	mir	Mirror-walls \rightarrow increased mating-rate;			9		79	/*\p343c2, /t\p152
80	E I	leg	RatMites detect IR (incl. specif. freqs) via setae spines on front leg-tarsals			9		80	Bruce (1971 jul)

81	F	las	VisibleLight: Laser efficiency in producing action-potential "spikes" in nerves >> mere	a^		5	5	81	Callahan (1968) ^{ApplOpt7:1425-30}
			mixed-phase monochrome efficiency (by 42x),						Bruce(1971) ^{AnESAm64:925-31}
82	E	mol	Enantiomeric (opt.isomer) forms of scent molecs → different responses after conditioning to one of them — in locust & bee — cit./D2\p108.4 (#logic!)			9		82	Kafka+3(1973) ^{JCompPhio87,277;+(1971?)}
83	E A	odi	Circumstantial evidence favouring contact-mechanisms for odour detection in insects, eg template "lock-&-key" fit for specific molecules			9		83	Kaissling (1971)
84	E A	odm	Evidence (incl elimination) favouring contact-mechanisms for odour detection in <i>mammals</i> , eg template "lock-&-key" fit for specific molecules			9		84	Altner&Prillinger (1980), Davies (1971), Beets(1971)
85	A	emp	Proof of C's ae(1 or 2 — idea of $A \rightarrow IR \rightarrow Z$) requiress positively demonstrating $IR \rightarrow Z$ in absence of A. [Empirical insistence]		М	-	-	85	/D2\p106.6, 106.7
86	Η	sp~	IR reception can be conveyed direct to the dendrite <u>as</u> natural IR, (without needing any "spike"); — then conducted on dendrite surface [RRT] "[R]"	b^		9	9	86	NEW; Schriever(1920)
87	E	lip	IR signals (as such) may travel along dendrites, thus obviating any need for Action potential spikes (& explaining why C didn't find them); Dupl 86		х			87	NEW
88	E	res	IR \rightarrow measurable response (whatever the route)	di		5	9	88	Callahan
89	E	nat	Natural coherence (phase correlation), eg for expts in Fresnel's day	a`		9	9	89	NEW (in this context)
90	A	dst	Geometry, frequency, & phase distributions (or cloud emission) — "bullseye" model	a+			9	90	NEW
91	F	cld	Female moths & food crops → pheromones or other chem "odours" — but which may also have significant IR-optical properties	a+		5	9	91	Callahan etc
92	F	wvg	Time-pattern information capture from macro-waveguide \rightarrow TV demodulation etc	b		1	9	92	well known
93	F	mye	Time-pattern information capture from myelin segment \rightarrow molecular demodulation?	b			9	93	Traill (2005b)
94	F	spL	Callahan did find action-potl. spikes for <u>visible</u> light ("gating" the IR reception throughout the antenna). — [but apparently no spikes from IR itself]	b		5	5	94	Callahan(1968)p1425-; Hsiao('72), Diesendorf
95	Н	u:=	UV <u>PLUS</u> pheromone-scent → IR through fluorescence; [& this IR is what increases the mating rate]	a+		9	9	95	/t\p149-162 (e.g.)

The Same Table Sorted according to first-mentioned Author-or-Source (in Last column)

#	ty r	mn	Description	sub	ext	nr	far	#2	References and sources
8	H k	cy1	Some insect "knobs" are lock&key contact-detectors for scent-molecules			9=		8	
9	H k	cy0	(Almost) no insect "knobs" are lock&key contact-detectors for scent-molecules			9=		9	
11	H s.	Ax	Any contact(A)-discrimination* between scents depends on molecule geometry (<i>xyz</i>) *See #2 and its nearness-categories A,B,C			9		11	
12	H s	зBx	Some dipole-near(B)-discrimination* between scents depends on molecule geometry (<i>xyz</i>) *See #2 and its nearness-categories A,B,C			9		12	
13	H s	sBt	Some dipole-near(B)-discriminatn between scents depends on electromagnetic <i>time-patterns</i> from the scent molecules (<i>t</i>)			9		13	
14	H s	sCt	Any dipole-far(C)-discrimination between scents depends on electromagnetic <i>time-patterns</i> from the scent molecules (<i>t</i>)			9		14	
61	A 1	flc	"radiation-pumping" of molecules can mislead closeup (especially near Humans), so alternatives could help			9		61	
66	A c	cg2	Insect's sensing of concentration-gradient is by d/dt: remembering + retesting — like chemotaxis in Escherichia coli bacteria			9		66	Alberts <i>et al</i> (1983), pp575-579
23	Еe	ecg	<i>E.coli</i> uses a <i>d/dt</i> gradient to find a near target			9		23	Alberts et al,(1983), p758
84	E o A	dm	Evidence (incl elimination) favouring contact-mechanisms for odour detection in <i>mammals</i> , eg template "lock-&-key" fit for specific molecules			9		84	Altner&Prillinger (1980), Davies (1971), Beets(1971)
35	A d	l <x< td=""><td>Diesendorf /D4\125.2 "then<u>molecular structure</u>"[xyz]; anyhow "<u>sensilla shapes</u> become irrelevant toolfaction" <u>cf</u>.array</td><td></td><td>F</td><td></td><td>?</td><td>35</td><td>Amoore (1971), etc. NEW: see</td></x<>	Diesendorf /D4\125.2 "then <u>molecular structure</u> "[xyz]; anyhow " <u>sensilla shapes</u> become irrelevant toolfaction" <u>cf</u> .array		F		?	35	Amoore (1971), etc. NEW: see
80	E 1	leg	RatMites detect IR (incl. specif. freqs) via setae spines on front leg-tarsals			9		80	Bruce (1971 jul)
3	Ha	ae2	All (or nearly all) insect innervated "knobs" & pits are electromagnetic aerials (capable of <i>time-pattern</i> discrimination, like TV)	b+		5=	9=	3	Callahan
4	Ha	ael	Some insect innervated "knobs" & pits are electromagnetic aerials (capable of <i>time-pattern</i> discrimination, like TV)	b+		5=	9=	4	Callahan
72	A i	irS	Ambient (incoherent?) short-wave-IR offers source of pumping-energy	а		9	9	72	Callahan
88	Еı	res	$IR \rightarrow measurable response (whatever the route)$	di		5	9	88	Callahan
16	Нb	owi	Any "bod"(#15) IR signal is modulated (made discriminable) by <i>time</i> -code of wing-flaps etc; [<i>t</i> -code]	a.		5	5	16	Callahan (1965a,)
81	F 1	las	VisibleLight: Laser efficiency in producing action-potential "spikes" in nerves >> mere mixed-phase monochrome efficiency (by 42×),	a^		5	5	81	Callahan (1968) ^{ApplOpt7:1425-30} Bruce(1971) ^{AnESAm64:925-31}

40 E sp# Se	eems: No reported direct evidence that $IR \rightarrow action potential spikes [vet Callahan did$	1.4				
	find such spikes for <u>visible</u> light ("gating": see "spL" (#94)).]	b	5	5	40	Callahan(1968)p1425-; Hsiao('72), Diesendorf
94 F spL Ca	allahan did find action-potl. spikes for <u>visible</u> light ("gating" the IR reception throughout the antenna). — [but apparently no spikes from IR itself]	b	5	5	94	Callahan(1968)p1425-; Hsiao('72), Diesendorf
43 E ge2 tap	pering & other geometry of (micro) dielectric insect spines ↔ macro dielectric ≈42	b.	9	9	43	/*\ [Callahan: continued \downarrow]
26 A pi= Gr	rant's pits seen as aerial types	b+	9	9	26	/*\p138, Grant (1949)
69 ^F c~3 Th	he concentration of a scent affects the frequency of its stimulated emission;	а	9	9	69	/*\p175-7, 187, 211
20 H el: Ins	sect cuticle is capable of forming electrets		5		20	/*\p319
42 E gel tar	pering & other geometry of macro dielectric aerial \rightarrow match impedance free space	b.	9	9	42	/*\p323c2
44 E dir W	Valf Spider points spines toward target		9		44	/*\p325 fig 14
52 E dk~ W	In the spine points spines toward unget		9	-	52	/*\n326_/t\n133
	any antennae				-	/ 4920, /(19135
46 E IT M	Ioths have irridescence etc for IR frequencies		9	0	46	/*\p330
47 E amp "N	Maser-like" Stimulated-emission can \rightarrow amplification	a^	9	9	47	/*\p331
48 E tow M	Iaser-like Stimulated-emission is very common in IR \rightarrow amplification	a^	9	9	48	/*\p333c1; Townes(1965) ^{3c/149} p837
49 E qm0 So	ome scent-atom/molec will start with excitation energy when they leave target [but ephemeral]		9		49	/*\p333c2.9
50 F co/ op	ptical "coherence" can be partial	a`	9	9	50	/*\p334c2.9
51 F co^ pa	artial "coherence" can, in principle, suffice to override random background noise	a`	9	9	51	/*\p334c2.9
53 A drx M	Iolecules do act as dipole aerials — (Townes, 1965; Drexhage, 1970)	d:	9	9	53	/*\p335c1.7; Drexhage (1970)
55 <u>E</u> wHi Hi	igh relative.humidity blocks IR Duplicates irH (74) qv	2	K		55	/*\p336
74 E irH Ri	ising Relative-Humidity increasingly kills off IR signals	d/	9	9	74	/*\p336
45 E win At	tmos windows for IR match corneal lens transmission windows	d/		9	45	/*\p338-9
56 E eyl Co	orneal lens is an "eve" for incoherent IR — & better than the bee-eye (for visible & UV)	di	9	5	56	/*\p338c2
75 E ir# At	t High Relative-Humidity, insect mating etc fails to occur	d/	9	9	75	/*\p339c2.4
76 E ir/ At	t High Relative-Humidity, arthropods spend much time wiping antennae etc (even to exhaustion)	d/	9	9	76	/*\p339c2.8
57 A # Irr	relevant here: how <i>mammalian</i> olfaction operates		5		57	/*\p341c2.3
58 A #zz Irr	ralevant bara: What hannans when directly destructive intensities are used?		X 5	5	58	/*\n341c2.4
21 H elt FL	lectrate might serve as memory elements (<i>k</i> collectively like a Lamarchian tang recorder)			-	21	/*\p341c2.4
70 A t&e Sn	nines can have dual roles: tactile AND electromagnetic	b	- 9	8	70	/*\p342c2.8
41 F key Co	oncistent phase control could serve as calleign ID, different from noise & other signals	a`	9	9	41	$/*(p_{342c2.6})$
59 E fla M	lothe follow pheromone long range, but then candle flame at short range		9	-	59	/*\p343c1.4 (Eabre 1013)
IVI	tonis follow phetomone long-range, out men candie-marile at short-range				57	Shorev&Gaston, 1965)
79 E mir M	lirror-walls→ increased mating-rate:		9		79	/*\p343c2. /t\p152
60 H flb IR	R attraction operates via "radiation-pumped molecules" — (method "1": ppT) ≈ 31	a:	9	9	60	/*\p343c2.2
71 F ir^ At	mbient IR remains abundant at night	а	9	9	71	/*\p344 (eg)
37 E vib Of	ft-seen "vibrations" of antennae [These "must have some meaning"]	с	9	8	37	$/C_3 \times 12.2 - + (C/* \times 321c_1)$
						1965b ^{AnESAm58:159-69})
33 ^A d>> Fo	or "far" dipole-range ($d > \lambda$), phase patterns are const <u>with respect to <i>time</i></u> , so <i>d</i> "makes no difference"		9		33	/ C3 \115.1
36 E rub Ins	sect is "constantly rubbing" especially in humid conditions [This "must have some meaning"]	с	9	8	36	/C3\p112.2
38 A oft Of	ft-seen behaviour or bio-structures must have significance (else eliminated by evolution)	с	9	8	38	/C3\p112.2
30 A +ru So	ome Energy for pheremone IR signals from rubbing:	с	5	9	30	/C3\p113.38: O: /D2?\107.1
31 F +fl So	ome Energy for pheremone IR signals via fluorescence ex blue/UV/: ≈ 60	a:	9	9	31	/C3\p113.38: O: /D2?\107.1
78 E u&s St	trong interaction effects increase the mating-rate.	a+	9	9	78	/t\p149-162 (e.g.)
	[eg. UV <u>PLUS</u> pheromone-scent — see "u:=" (95)];					(1.8.)
95 H u:= U	V <u>PLUS</u> pheromone-scent \rightarrow IR through fluorescence; [& this IR is what increases the mating rate]	a+	9	9	95	/t\p149-162 (e.g.)
64 H f13 Us	se of close-up homing-method 3: traditional <u>olfaction via concentration-gradient</u> (perhaps via some roundabout effect)		9		64	/t\p187
67 A cg3 Ins	sect's sensing of concentration is by the frequency of its nearby stimulated emission:	\square	9		67	/t\p187,fig.20
68 H cg# Fro	requency of the target-female's pheromone IR emission indicates its concentration, hence how near it is. Could aid targeting.	a	5	5	68	/t\p189 [Callahan: Last Ref]
63 <u>H</u> fl2 ∐s	se of close-up homing-method 2: "normal" incoherent-light-or-IR vision —	\vdash	9		63	common assumption
65 A cg1 Ins	sect's sensing of concentration-gradient is by d/dx: comparing 2+ sensors simultaneously;	\square	9		65	common assumption

73	Hi	irL	Ambient (incoherent) longer -wave-IR constitutes noise which will kill the needed signals. [NEG]	a`		9	9	73	Diesendorf
27	H p	hm	Some (discriminable) IR signals come from pheremone molecules;	a+		9	9	27	Diesendorf:/D0\34.7
32	A p	beg	Grant's "peg" = pit-sensilla, well-placed to "fire" dendrite; → action-potential spike (or TEM mode fibre-optic signal! — NEW)	b		9	9	32	Diesendorf:/D0\36.8, Grant, NEW
28	A +	⊦sp	Energy for pheremone IR signals can come from mere black-body spontaneous emissn; [denied by Diesendorf]	a!		9	9	28	/D0\42-3
29	A +	-bo	Energy-supply for any pheremone IR signals must be adequate & sustainable (≈ 15)	a.		9	9	29	/D0\44+
85	A e	mp	Proof of C's ae(1 or 2 — idea of $A \rightarrow IR \rightarrow Z$) requiress positively demonstrating $IR \rightarrow Z$ in absence of A. [Empirical insistence]		М	-	-	85	/D2\p106.6, 106.7
62	Ef	fld	Despite the case for closeup homing via "2 & 3", insects <i>are</i> still misled — as if using "1" alone			9		62	Fabre
22	E f	fab	far detection is possible (when no scent molecules could be reaching the receptor)	а			9	22	Fabre, Laithwaite
2	H <	<ch< td=""><td>We should distinguish 3 range-zones for any possible chemical olfaction: (A) Contact mol/ receptor; (B) "Dipole-near" (<50nm?); (C) "Dipole-far" (>50nm)</td><td></td><td></td><td>9</td><td></td><td>2</td><td>from standard Dipole Theory</td></ch<>	We should distinguish 3 range-zones for any possible chemical olfaction: (A) Contact mol/ receptor; (B) " Dipole-near " (<50nm?); (C) " Dipole-far " (>50nm)			9		2	from standard Dipole Theory
24	EI	pit	Grant's pits have geometry compatible with their being electromagnetic aerials;	b+		9	9	24	Grant (1949)
25	EI	pir	Grant's pits: size is such that, if aerials, they are appropriate for IR reception	b+		9	9	25	Grant (1949)
82	En	nol	Enantiomeric (opt.isomer) forms of scent molecs → different responses after conditioning to one of them — in locust & bee — cit./D2\p108.4 (#logic!)			9		82	Kafka+3(1973) ^{JCompPhio87,277;+(1971?)}
83	E c A	odi	Circumstantial evidence favouring contact-mechanisms for odour detection in insects,			9		83	Kaissling (1971)
			eg template "lock-&-key" fit for specific molecules			_			
7	Hk	cy2	(Almost) all insect "knobs" are lock&key contact-detectors for scent-molecules			9=	*	7	Kettlewell; /*\326c2"fit"
1	H <	sya	We should distinguish Laithwaite's 2 target-range-zones: near (<100yds), far (>=100yds)		м	*	~	1	Laithwaite (1960)
17	Ha	ant	Whole antenna could theoretically act as an aerial for FIR (20-200µm);	b		9	9	17	Laithwaite (1960 Jul)
18	F +	++	Whole antenna is like a military "fishbone" aerial array for radar;	b		5	9	18	Laithwaite (1960 Jul)
19	Ε¢	off	Signal "switched off" soon after mating;	а			9	19	Laithwaite (1960 Jul)
15	A b	ood	Some (discriminable) IR signals come from the target's body heat; (≈ 29)	a.		5	5	15	Laithwaite (1960 Jul); critic/0\34.7
54	A d	lco	Human retinal cones may well serve as dipole aerials — [eye oscillation — NB]	d:		9	9	54	Myers (1965) /*\p342c2.4
34	A d	i <t< td=""><td>For "near" dipole-range (d<<λ), phase patterns are different, NOT absent as Diesendorf, /D2\109.3 implies</td><td></td><td></td><td>9</td><td></td><td>34</td><td>NEW</td></t<>	For "near" dipole-range (d<<λ), phase patterns are different , NOT absent as Diesendorf, /D2\109.3 implies			9		34	NEW
77	H c	coh	For Callahan (/*\p316+) (& perhaps Groner, his source?), "coherence" actually means "consistent phase-control"		D			77	NEW
87	El	lip	IR signals (as such) may travel along dendrites, thus obviating any need for Action potential spikes (& explaining why C didn't find them): Dupl 86		х			87	NEW
90	A c	dst	Geometry, frequency, & phase distributions (or cloud emission) — "bullseve" model	a+			9	90	NEW
89	Er	nat	Natural coherence (phase correlation), eg for expts in Fresnel's day	a`		9	9	89	NEW (in this context)
39	H s	spi	Assume any IR reception \rightarrow response via action-potential "spike"	b^		9	9	39	physiologists' standard assumption
			"[A]"						
86	H s	sp∼	IR reception can be conveyed direct to the dendrite <u>as</u> natural IR, (without needing any "spike"); — then conducted on dendrite surface [RRT] "[R]"	b^		9	9	86	Schriever(1920) NEW;
93	Fn	nye	Time-pattern information capture from myelin segment \rightarrow molecular demodulation?	b			9	93	Traill (2005b)
6	Fa	ie=	TV, radio, radar, etc have "knobs" which serve as electromagnetic aerials capable of <i>time-pattern</i> discrimination	b		5	9	6	well known
10	E k	xy=	The immune system uses molecular lock&key contact-detectors for identification; (xyz)			9		10	well known
92	Fw	vvg	Time-pattern information capture from macro-waveguide \rightarrow TV demodulation etc	b			9	92	well known