621.

ON THE NUMBER OF THE UNIVALENT RADICALS C_nH_{2n+1}.

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I HAVE just remarked that the determination is contained in my paper "On the Analytical Forms called Trees, &c.," *British Association Report*, 1875, [610]; in fact, in the form C_nH_{2n+1}, there is one carbon atom distinguished from the others by its being combined with (instead of 4, only) 3 other atoms; viz. these are 3 carbon atoms, 2 carbon atoms and 1 hydrogen atom, or else 1 carbon atom and 2 hydrogen atoms (CH_3, methyl, is an exception; but here the number is $=1$). The number of carbon atoms thus combined with the first-mentioned atom is the number of main branches, which is thus $=3$, 2, or 1; hence we have, number of radicals C_nH_{2n+1} is $=$

No. of carbon root-trees C_n with one main branch,
+ No. of " " with two main branches,
+ No. of " " with three main branches;

and the three terms for the values $n=1$ to 13 are given in Table VII. (pp. 454, 455 of this volume) of the paper referred to.

Thus, if $n=5$, an extract from the Table (p. 454 of this volume), is

Index x, or number of knots	Index t, or number of main branches	Altitude					
		0	1	2	3	4	
5	1			1	2	1	4
	2			2	1		3
	3			1			1
	4		1				1
	Total ...		1	4	3	1	9

and the number of the radicals C_5H_{11} (isomeric amyls) is $4+3+1=8$: or, what is the same thing, it is $9-1$, the corner-total less the number immediately above it. The tree-forms corresponding to the numbers 1, 2, 1; 2, 1; 1 in the body of the Table are the trees 2 to 9 in the figure, p. 428 of this volume.

The numbers of the radicals C_nH_{2n+1}, as obtained from the Table in the manner just explained, are:—

$n=$	Number of radicals C_nH_{2n+1}.		
1	1	= 1	Methyl.
2	1	1	Ethyl.
3	1	1	Propyl.
4	4	4	Butyls.
5	9 − 1	8	Amyls.
6	18 − 1	17	Hexyls.
7	42 − 3	39	Heptyls.
8	96 − 7	89	Octyls.
9	229 − 18	211	Nonyls.
10	549 − 42	507	Decyls.
11	1346 − 108	1238	Undecyls.
12	3326 − 269	3057	Dodecyls.
13	8329 − 691	7638	Tridecyls.

The question next in order, that of the determination of the number of the bivalent radicals C_nH_{2n}, might be solved without much difficulty.

Cambridge, November 20, 1876.