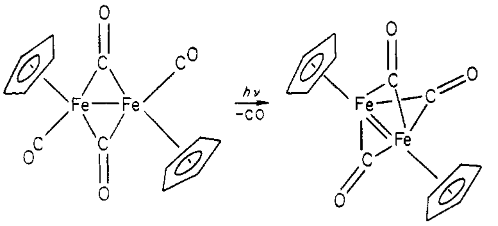
can form a symmetrical (μ-CO)$_3$ complex without gross movement of the C$_5$ rings (eq 2), whereas reaction of the



(2)

cis isomer would require large movement of the C$_5$ rings. The inability to capture the tricarbonyl from photolysis of III with 2-MeTHF suggests that the loss of CO and rearrangement to form the (μ-CO)$_3$ structure is concerted. The difference in photosensitivity of the cis and trans species and the role of the tricarbonyl photoproduct in solution photochemistry are presently under study in this laboratory.

Acknowledgment. We thank the National Science Foundation for support of this research.

Registry No. *cis*-I, 33221-55-5; *trans*-I, 32757-46-3; *cis*-II, 88080-00-6; *trans*-II, 87985-72-6; III, 12132-03-5; (η^5-C$_5$H$_5$)$_2$Fe$_2$(CO)$_3$, 87985-70-4; (η^5-C$_5$Me$_5$)$_2$Fe$_2$(CO)$_3$, 87985-71-5; (η^5-C$_5$H$_4$Bz)$_2$Fe$_2$(CO)$_3$, 87985-73-7; Fe, 7439-89-6.

Carbon Chain Growth via Methylene (CH$_2$) Additions to Cluster-Bound Unsaturates: Conversion of μ_3-η^2-Acetylides to μ_3-η^3-Allenyl and μ_3-η^4-2,3-Butadienylidene Complexes with Diazomethane

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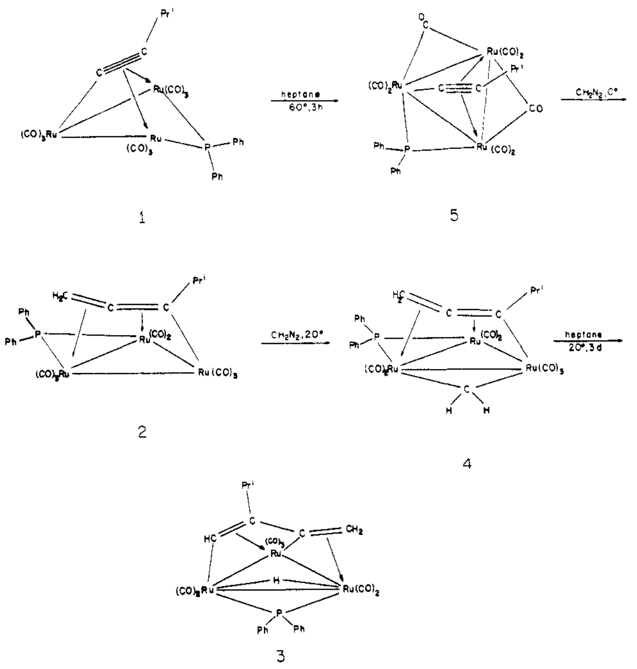
Summary: The synthesis of a cluster-bound μ_3-η^3-allenyl ligand in Ru$_3$(CO)$_8$(μ_3-η^2-CH$_2$=C=C-*i*-Pr)(μ-PPh$_2$) (**2**) from a μ_3-η^2-acetylide, Ru$_3$(CO)$_9$(μ_3-η^2-C$\equiv$C-*i*-Pr)(μ-PPh$_2$) (**1**), via methylene (CH$_2$) addition and the subsequent conversion of **2** to the 2,3-butadienylidene[21] cluster (μ-H)-Ru$_3$(CO)$_7$(μ_3-η^4-CH$_2$=CC(*i*-Pr)=CH)(μ-PPh$_2$) (**3**) by methylidyne (CH) transfer from the μ-methylene intermediate Ru$_3$(CO)$_7$(μ_3-η^3-CH$_2$=C=C-*i*-Pr)(μ-CH$_2$)(μ-PPh$_2$) (**4**) are described. The structures of the new clusters **2**, **3**, and **4** have been determined by X-ray diffraction. Facile carbon–carbon bond formation between multisite-bound unsaturated ligands and diazomethane-derived methylene or methylidyne fragments may offer new opportunities for cluster-mediated ligand synthesis.

Scheme I



Currently favored mechanisms for carbon–carbon chain growth in Fischer–Tropsch synthesis[1] and C–C bond cleavage in hydrocarbon hydrogenolysis[2] involve the intermediacy of surface-bound μ-methylenes. In the case of hydrocarbon synthesis, C–C bond formation may occur via CH$_2$ insertion into a metal–alkyl bond,[1] coupling with a surface olefin,[3] or migrations to other surface ligands including carbides or carbynes. Molecular models for some of these processes have recently been discovered in the chemistry of binuclear μ-methylene complexes[4,5] and in the reactions of transition-metal compounds with methylene precursors.[5,6]

Somewhat surprisingly, in view of the metal cluster–metal surface analogy, few reports of C–C bond formation involving methylene groups and unsaturated fragments in polynuclear clusters have appeared[6] despite the obvious relevance of such reactions to cluster-mediated synthesis, ligand elaboration, and catalysis. As a continuation of our studies on reactivity patterns for multisite-bound unsaturates,[7] we have examined the behavior of the cluster acetylide Ru$_3$(CO)$_9$(μ_3-η^2-C$\equiv$C-*i*-Pr) (μ-PPh$_2$), **1**, toward diazomethane. In this communication we report the facile transformation of **1** to the allenyl complex Ru$_3$(CO)$_8$(μ_3-η^3-CH$_2$=C=C-*i*-Pr)(μ-PPh$_2$), **2**, and subsequently to the hydrido 2,3-butadienylidene cluster (μ-H)Ru$_3$(CO)$_7$(μ_3-η^4-CH$_2$=CC(*i*-Pr)=CH) (μ-PPh$_2$), **3**, via the intermediacy of a μ-methylene compound, Ru$_3$(CO)$_7$(μ-CH$_2$)(μ_3-η^3-CH$_2$=C=C-*i*-Pr)(μ-PPh$_2$), **4**. These reactions support the

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(1) Brady, R. C., III; Pettit, R. *J. Am. Chem. Soc.* **1981**, *103*, 1287.

(2) Brady, R. C., III; Pettit, R. *J. Am. Chem. Soc.* **1980**, *102*, 6181.

(3) (a) O'Donohue, C.; Clarke, J. K. A.; Rooney, J. J. *J. Chem. Soc., Faraday Trans. 1* **1980**, *76*, 345. (b) Hugues, F.; Besson, B.; Bussière, P.; Dalmon, J. A.; Basset, J. M.; Olivier, D. *Nouv. J. Chim.* **1981**, *5*, 207.

(4) (a) Sumner, C. E., Jr.; Collier, J. A.; Pettit, R. *Organometallics* **1982**, *1*, 1350. (b) Isobe, K.; Andrews, D. G.; Mann, B. E.; Maitlis, P. E. *J. Chem. Soc., Chem. Commun.* **1981**, 809. (c) Herrmann, W. A.; Plank, J.; Riedel, D.; Ziegler, M. L.; Weidenhammer, K.; Guggolz, E.; Balbach, B. *J. Am. Chem. Soc.* **1981**, *103*, 63. (d) Hursthouse, M. B.; Jones, R. A.; Abdul Malik, K. M.; Wilkinson, G. *Ibid.* **1979**, *101*, 4128. (e) Theopold, K. H.; Bergman, R. G. *Ibid.* **1981**, *103*, 2489.

(5) For closely related reactions of other μ-alkylidenes see, for example: (a) Colborn, R. E.; Dyke, A. F.; Knox, S. A. R.; MacPherson, K. A.; Orpen, A. G. *J. Organomet. Chem.* **1982**, *239*, C15. (b) Dyke, A. F.; Knox, S. A. R.; Naish, P. J.; Taylor, G. E. *J. Chem. Soc., Chem. Commun.* **1980**, 803. (c) Cooke, M.; Davies, D. L.; Guerchais, J. E.; Knox, S. A. R.; Mead, K. A.; Roué, J.; Woodward, P. *Ibid.* **1981**, 862. (d) Herrmann, W. A. *Adv. Organomet. Chem.* **1982**, *20*, 159 and references therein.

(6) (a) Shapley, J. R.; Sievert, A. C.; Churchill, M. R.; Wasserman, H. J. *J. Am. Chem. Soc.* **1981**, *103*, 6975. (b) Clauss, A. D.; Shapley, J. R.; Scott, S. R. *Ibid.* **1981**, *103*, 7387.

(7) (a) Carty, A. J. *Pure Appl. Chem.* **1982**, *53*, 113. (b) MacLaughlin, S. A.; Johnson, J. P.; Taylor, N. J.; Carty, A. J.; Sappa, E. *Organometallics* **1983**, *2*, 352 and references therein.

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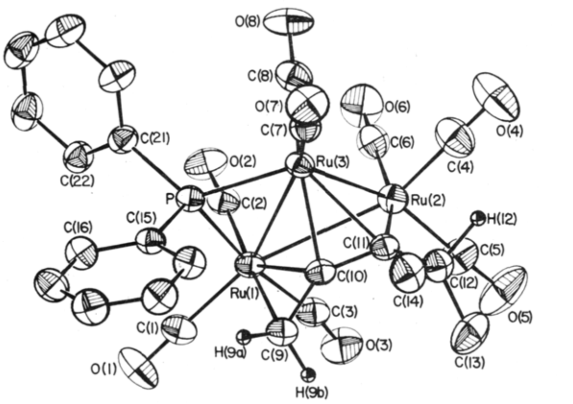

Figure 1. A view of the structure of $Ru_3(CO)_8(\mu_3\text{-}\eta^3\text{-}CH_2{=}C{=}C\text{-}i\text{-}Pr)(\mu\text{-}PPh_2)$ (**2**) drawn to illustrate the interaction of the allenyl unit with the cluster.

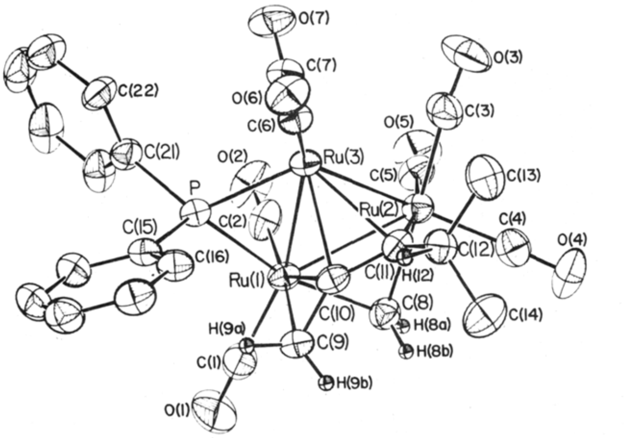

Figure 2. An ORTEP plot of the structure of $Ru_3(CO)_7(\mu\text{-}CH_2)(\mu_3\text{-}\eta^2\text{-}CH_2{=}C{=}C\text{-}i\text{-}Pr)(\mu\text{-}PPh_2)$ (**4**) showing the stereochemical relationship to **2**.

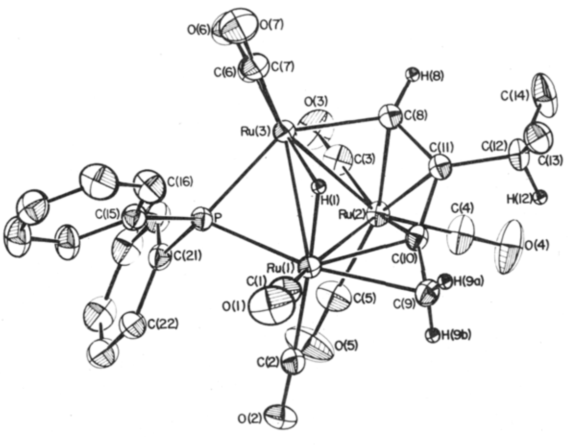

Figure 3. The hydrido 2,3-butadienylidene cluster $(\mu\text{-}H)Ru_3(CO)_7(\mu_4\text{-}\eta^4\text{-}CH_2{=}CC(i\text{-}Pr){=}CH)(\mu\text{-}PPh_2)$ (**3**).

possibility of facile carbon chain growth involving methylene groups and unsaturated fragments in clusters and suggest that methylene additions to *coordinated* carbon ligands may provide new opportunities for novel ligand synthesis.

Addition of excess ethereal diazomethane[8] to an ether solution of $Ru_3(CO)_9(\mu_3\text{-}\eta^2\text{-}C{\equiv}C\text{-}i\text{-}Pr)(\mu\text{-}PPh_2)$, **1**[9] (200 mg, 0.25 mmol), at −5 °C, affords three new compounds separable by column chromatography on Florisil. Elution with heptane gives four bands: $Ru_3(CO)_7(\mu\text{-}CH_2)(\mu_3\text{-}\eta^3\text{-}CH_2{=}C{=}C\text{-}i\text{-}Pr)(\mu\text{-}PPh_2)$, **4**,[10] first band, gray, 15%; $(\mu\text{-}H)Ru_3(CO)_7(\mu_3\text{-}\eta^4\text{-}CH_2{=}CC(i\text{-}Pr){=}CH)(\mu\text{-}PPh_2)$, **3**,[11] second band, yellow, 5%; $Ru_3(CO)_8(\mu_3\text{-}\eta^3\text{-}CH_2{=}C{=}C\text{-}i\text{-}Pr)(\mu\text{-}PPh_2)$, **2**,[12] third band, maroon, 35%; $Ru_3(CO)_6(\mu\text{-}CO)_2(\mu_3\text{-}\eta^2\text{-}C{\equiv}C\text{-}i\text{-}Pr)(\mu\text{-}PPh_2)$, **5**,[9] fourth band, orange, 10%. All yields are based on recovery by crystallization from heptane solutions except **5** which was precipitated as **1** by bubbling carbon monoxide through the eluted solution. The sequential nature of these reactions and the interrelationships between **2–4** have been thoroughly es-

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(8) Diazomethane was prepared according to standard procedures using Aldrich Chemical Co. *N*-methyl-*N*-nitroso-*p*-toluenesulfonamide.

(9) Carty, A. J.; MacLaughlin, S. A.; Taylor, N. J. *J. Organomet. Chem.* **1981**, *204*, C27.

(10) **4**: IR ν(CO) (C_6H_{12}) 2064 m, 2025 m, 2011 s, 1973 w, 1953 m; ^{31}P NMR (CD_3COCD_3, −65 °C) δ +139.3 (wrt 85% H_3PO_4); ^1H NMR ($CDCl_3$, −60 °C) δ 0.99 (d, 3 H, J = 5.9 Hz), 1.02 (d, 3 H, J = 6.6 Hz), 2.46 (m, 1 H, J = 6.3 Hz), 2.76 (s, 1 H), 2.79 (s, 1 H), 6.19 (s, 2 H), 7.29–7.41 (m, 10 H).

(11) **3**: IR ν(CO) (C_6H_{12}) 2066 m, 2033 s, 2014 s, 2004 m, 1983 m, 1950 m; ^{31}P NMR (CD_3COCD_3, −65 °C) δ +184.3; ^{13}C NMR ($CDCl_3$, −60 °C, proton coupled) δ 199–193 (m, CO) 184.1 (s), 149.2 (dd, C(8), $^2J_{PC}$ = 38 Hz, $^1J_{CH}$ = 150 Hz), 139.4 (d, ipso-CPh, $^1J_{PC}$ = 25 Hz), 132.6 (d, ipso-CPh, $^1J_{CP}$ = 10 Hz), 133–128 (m, phenyl rings), 120.0 (s), 41.8 (t, C(9), $^1J_{CH}$ = 164 Hz), 37.3 (d, C(12), $^1J_{CH}$ = 129 Hz), 22.7 (q, CMe, $^1J_{CH}$ = 127 Hz), 22.0 (q, CMe, $^1J_{CH}$ = 126 Hz); ^1H NMR (CD_2Cl_2, −70 °C) δ −18.4 (d, 1 H, J_{PH} = 22 Hz), 1.3–1.4 (dd, 6 H), 2.7 (m, 1 H), 4.5 (s, 2 H), 7.0–8.0 (m, 6 H), 8.3 (s, 1 H).

(12) **2**: IR ν(CO) (C_6H_{12}) 2075 m, 2047 s, 2018 m, 2007 m, 1996 w, 1989 w, 1975 w, 1946 m; ^{31}P NMR ($CDCl_3$, 40 °C) δ +269.4 (wrt 85% H_3PO_4); ^{13}C NMR ($CDCl_3$, −60 °C, proton coupled) δ 210.9 (s, CO), 200.7 (s, CO), 197–195 (m, 4 CO), 194.8 (s, CO), 193.4 (d, CO, $^2J_{PC}$ = 73 Hz), 172.0 (s), 142.7 (s), 140.6 (d, ipso-CPh, $^1J_{PC}$ = 30 Hz), 134.6 (d, ipso-CPh, $^1J_{PC}$ = 30 Hz), 133–128 (m, phenyl rings), 43.8 (d, C(12), $^1J_{CH}$ = 131 Hz), 24.8 (q, CMe, $^1J_{CH}$ = 126 Hz), 23.6 (q, CMe, $^1J_{CH}$ = 126 Hz), 20.1 (t, C(9), $^1J_{CH}$ = 161 Hz); ^1H NMR ($CDCl_3$, −60 °C) δ 1.22 (d, 3 H, J = 7 Hz), 1.25 (d, 3 H, J = 7 Hz), 1.65 (d, 1 H, J_{PH} = 4 Hz), 1.67 (d, 1 H, J_{PH} = 4 Hz), 3.04 (m, 1 H, J = 7 Hz) 7.3–7.6 (10 H).

(13) Crystals of **2** grown from a heptane solution at −20 °C are monoclinic of space group $P2_1/c$ with a = 11.892 (2) Å, b = 12.200 (2) Å, c = 19.698 (4) Å, β = 93.22 (2)°, V = 2853 (1) Å^3, Z = 4, ρ(measd) = 1.85 g·cm^{-3}, ρ(calcd) = 1.847 g·cm^{-3}, and μ(Mo Kα) = 16.32 cm^{-1}. Intensity data were collected on a crystal of dimensions 0.19 × 0.22 × 0.23 mm using the θ–2θ scan technique ($2\theta \leq 46.0°$) on a Syntex $P2_1$ diffractometer using graphite-monochromated Mo Kα radiation (λ = 0.710 69 Å), variable scan speeds (2.93–29.3° min^{-1}), and a scan width from 0.8° below Kα_1 to 0.8° above Kα_2. From a total of 3997 independent reflections, 3007 with $I \geq 3\sigma(I)$ were used in the structure analysis. No decline in two standard reflections (308, 50$\bar{6}$) monitored every 100 measurements was noted. Data were corrected for Lorentz and polarization effects, but not for absorption. The three ruthenium atoms and the phosphorus atom were located from a Patterson map and light atoms via Fourier syntheses. Refinement with isotropic parameters for all non-hydrogen atoms gave an R ($R = \sum|F_o| - |F_c|/\sum|F_o|$) of 0.075 while with anisotropic coefficients R was 0.041. All hydrogen atoms were located in a difference map, and these were included in subsequent refinement cycles. Final R and R_w values ($R_w = [\sum w(|F_o| - |F_c|)^2/\sum w(|F_o|)^2]^{1/2}$) were 0.029 and 0.031, the final weighting scheme being of the form w^{-1} = 1.9–0.0185$|F|$ + 0.000 15$|F|^2$. The highest electron density in a final difference map was 0.5 e Å^{-3}. Scattering factors including corrections for anomalous dispersion for Ru were taken from ref 16. Computer programs used have been described elsewhere.[17] Atomic positions, thermal parameters, and bond lengths and angles are listed in supplementary Tables I–III, respectively. Structure factors are also available as supplementary data.

(14) Crystals of **3** grown from heptane solution at ambient temperature are triclinic of space group $P\bar{1}$ with a = 9.333 (2) Å, b = 10.200 (1) Å, c = 16.297 (2) Å, α = 87.25 (1)°, β = 83.26 (1)°, γ = 64.29 (1)°, V = 1388.2 (4) Å^3, Z = 2, ρ(measd) = 1.86 g·cm^{-3}, ρ(calcd) = 1.865 g·cm^{-3}, $F(000)$ = 760, and μ(Mo Kα) = 16.72 cm^{-1}. Intensity data were collected on a crystal of dimensions 0.25 × 0.29 × 0.29 mm as outlined above for **2**. The structure was solved and refined by using 5899 observed (6760 measured) data to final R and R_w values of 0.025 and 0.029, respectively. All hydrogen atoms were located and refined. A final difference map had no peaks >0.5 e Å^{-3}. Atomic coordinates, thermal parameters, bond lengths and angles are listed in supplementary Tables IV–VI. Structure factors have been deposited.

tablished by converting each of the intermediates as indicated in Scheme I.

The structures of clusters **2**, **3**, and **4** have been determined by single crystal X-ray diffraction.[13-15] ORTEP plots and structural formulas are depicted in Figures 1–3. In **2** the hydrocarbon moiety bonded to the face of the metal triangle is present as a 3-isopropyl-3-allenyl ligand formed by addition of a methylene fragment ($C(9)H_2$) to the α-carbon atom C(10) of the acetylide. The three-carbon allenyl unit[18] is coordinated to Ru(2) via a σ bond to C(11) and to Ru(3) and Ru(1) via η^2 interactions with C(10)–C(11) and C(9)–C(10). Although allene clusters have been characterized as products of reactions between metal carbonyls and dienes,[19] this represents the first synthesis of such a ligand on a cluster framework from the combination of a methylene group and a two-carbon fragment. Shapley and co-workers[6] have recently reported the synthesis of a face-bonded allyl group via thermally induced coupling of diphenylacetylene and methylene ligands. Similar diphenylacetylene–methylene coupling at a binuclear center yielding a vinyl carbene has been described.[5a]

Spectroscopic data[10,11] suggested that **3** and **4** were derived from the allenyl compound **2** via further addition of methylene units. Although the skeletal framework of **4** (Figure 2) resembles that of **2** with an edge-bridging PPh_2 group and an allenyl moiety across the Ru_3 face, a semibridging carbonyl in **2** (C(3)–O(3)) has been replaced by a methylene group bridging the Ru(1)···Ru(2) bond (Ru(1)–C(8)–Ru(2) = 81.6 (1)°). Stereochemically, the methylene carbon atom C(8) is cis related to both allenyl carbon atoms (C(10) on Ru(1) and C(11) on Ru(2)), thus providing a ready rationale for conversion to the more highly coupled product **3**. It is significant, however, that coupling of μ-methylene and allenyl groups in **4** yields mainly **3** whose structure (Figure 3) confirms bond formation between C(11), the original β-carbon atom of the acetylide bearing an isopropyl group, and C(8), the μ-methylene carbon atom of **4**. Furthermore, the conversion **4** → **3** occurs with hydrogen transfer from the methylene group onto the cluster leading to a hydrido-bridged μ_3-η^4-2,3-butadienylidene molecule. Thus the μ-methylene group provides a methylidyne (CH) unit for transfer to the hydrocarbyl ligand. The hydride is located along the shortest of the three Ru–Ru bonds (Ru(1)–Ru(3) = 2.7534 (2) Å) and on the same side of the cluster as the methylene-derived carbon atom C(8). That the bridging hydride in **3** is derived from the bridging methylene group of **4** was conclusively established by deuterium labeling experiments.[20] The hydrocarbyl unit in **3** is conveniently described as σ bonded to Ru(3) via C(8), η^2 coordinated to Ru(2) through C(8) and C(11), σ bonded to Ru(2) via C(10), and η^2 coordinated to Ru(1) through the double bond C(9)–C(10). To our knowledge this synthesis of the 2,3-butadienylidene ligand[21] of **3** on the face of a cluster from a multisite-bound unsaturated ligand and two molecules of diazomethane is unprecedented. It is interesting to note that the carbon atoms derived from diazomethane in **3** end up at *opposite* ends of the hydrocarbon chain. In the only other example of a two-carbon transfer reported to date,[5a] the methylene-derived atoms were coupled, affording a methyl vinyl carbene ligand in the binuclear compound $Ru_2(CO)_2(\mu\text{-}CO)\{\mu\text{-}C(Ph)C(Ph)C(H)Me\}(\eta\text{-}C_5H_5)_2$.

Although the intermediacy of an edge-bridged μ-methylene complex was evident in the conversion of **2** to **3**, no such species was detected in the sequence **1** → **2**. However, since the 50-electron cluster $Ru_3(CO)_9(\mu_3\text{-}\eta^2\text{-}C{\equiv}C\text{-}i\text{-}Pr)(\mu\text{-}PPh_2)$ reversibly loses CO in solution giving the reactive 48-electron species $Ru_3(CO)_6(\mu\text{-}CO)_2(\mu_3\text{-}\eta^2\text{-}C{\equiv}C\text{-}i\text{-}Pr)(\mu\text{-}PPh_2)$, **5**,[9] it is likely that a short-lived μ-methylene adduct of the latter is involved in the formation of **2**. Consistent with this, the rate of formation of **2** is greatly improved by prior synthesis of **5**.

In summary, our results confirm that methylene migration to cluster-bound unsaturated ligands is a rational strategy for C–C bond formation and hydrocarbon chain extension in cluster chemistry. Moreover, when considered in the light of related studies on trinuclear systems by Shapley,[6] and binuclear complexes by Knox,[5a] it is apparent that methylene–hydrocarbon reactions on polynuclear clusters may well provide useful models for certain aspects of catalytic hydrocarbon synthesis.

Acknowledgment. We are grateful to NSERC for financial support of this work through operating grants (A.J.C.) and a scholarship (D.N.). NMR spectra were obtained via the S. W. Ontario Regional NMR Facility at Guelph.

Registry No. **1**, 77681-75-5; **2**, 87829-51-4; **3**, 87829-52-5; **3**-d_1, 87829-53-6; **4**, 87829-54-7; **4**-d_2, 87829-55-8; **5**, 77681-78-8; diazomethane, 334-88-3.

Supplementary Material Available: Tables of atomic positions, thermal parameters, bond lengths and angles, and structure factor amplitudes for **2**, **3**, and **4** (84 pages). Ordering information is given on any current masthead page.

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(15) Crystals of **4** grown from heptane at −20 °C are monoclinic of space group $P2_1/c$ with a = 11.890 (2) Å, b = 11.973 (1) Å, c = 19.675 (2) Å, β = 90.10 (1)°, V = 2800.9 (6) $Å^3$, Z = 4, ρ(measd) = 1.85 g·cm^{-3}, ρ(calcd) = 1.849 g·cm^{-3}, $F(000)$ = 1520, μ(Mo Kα) = 16.58 cm^{-1}. The crystal used for data collection had dimensions 0.17 × 0.17 × 0.27 mm. Data were collected out to $2\theta \leq 50°$ giving 4957 independent reflections of which 3339 were considered observed ($I \geq 3\sigma(I)$). Refinement using anisotropic coefficients converged to R = 0.035 and R_w = 0.039 (including hydrogen atoms) using a final weighting scheme of $w^{-1} = 1.89 - 0.0173 |F| + 0.00017|F|^2$. Monitoring of the selected standard reflections having indices 304 and $32\bar{2}$ showed a variation of 6% over the course of data collection. Atomic coordinates, thermal parameters, and bond lengths and angles are listed in supplementary Tables VII–IX. Structure factors are also available.

(16) (a) "International Tables for X-ray Crystallography"; Kynoch Press: Birmingham, England, 1974. (b) Stewart, R. F.; Davidson, E. R.; Simpson, W. T. *J. Chem. Phys.* **1965**, *42*, 3175.

(17) Carty, A. J.; Mott, G. N.; Taylor, N. J.; Yule, J. E. *J. Am. Chem. Soc.* **1978**, *100*, 3051.

(18) Consideration of the geometry of the allenyl fragment C(9)–C(10)–C(11) and the Ru–C distances (Ru(1)–C(9) = 2.274 (6), Ru(1)–C(10) = 2.301 (5), Ru(2)–C(11) = 2.033 (6), Ru(3)–C(10) = 2.127 (5), Ru(3)–C(11) = 2.299 (5) Å) indicates coordination of the allenyl unit as a $\sigma,2\pi$ five-electron donor, the σ interaction being that between C(11) and Ru(2).

(19) Gervasio, G.; Osella, D.; Valle, M. *Inorg. Chem.* **1976**, *15*, 1221.

(20) The dideuteriomethylene derivative **4** was synthesized from **2** and dideuteriodiazomethane and then converted to deuterated **3**. The hydride resonance at δ −18.4 in nondeuterated **3** was absent in the labeled complex. Moreover the resonance attributed to the methine hydrogen (C(8)–H(8) of Figure 3) at δ 8.3 was also absent.

(21) Chemical Abstracts Service names the organic fragment in **3** on the basis of the most preferred form. **3** might be described as an allenylcarbene or as a butadienediyl ligand. Chemical Abstracts has indicated that the preferred nomenclature is 2-(1-methylethyl)-2,3-butadienylidene. We are grateful to B. R. Cook for this advice.