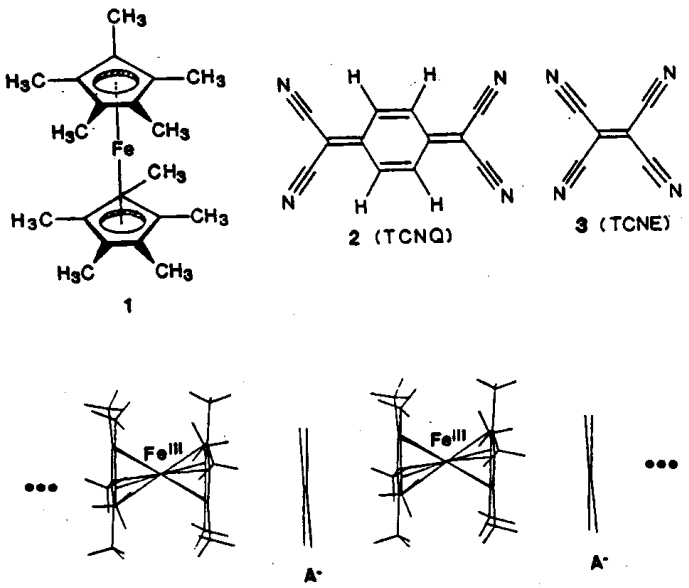

Figure 1. Alternating donor/acceptor, $\cdots D^{+\cdot}A^{-\cdot}D^{+\cdot}A^{-\cdot}\cdots$, linear-chain structure of $[Fe^{III}(C_5Me_5)_2]^{+\cdot}[A]^{-\cdot}$ (A = TCNQ, TCNE, DDQ, $C_4(CN)_6$), $[Fe^{II}(C_5H_5)_2][TCNE]$ and $[Fe^{III}(C_5Me_5)_2]^{+\cdot}[C_3(CN)_5]^-$. The structure shown here is for A = TCNE.

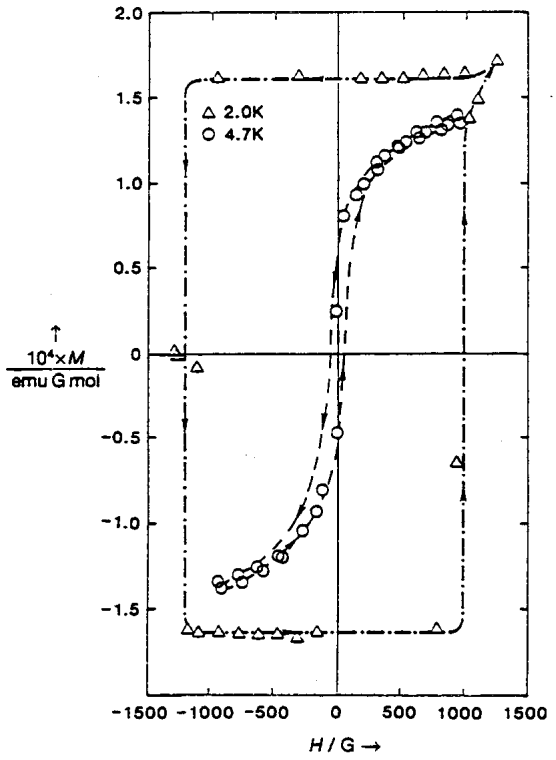

Fig. 14. The magnetization M as a function of applied field H for $[Fe^{III}Cp_2^*]^{+\cdot}[TCNE]^{-\cdot}$ shows hysteresis loops at 2 K.

Table I. Magnetic Coupling for Homospin Systems[9,12,a,b]

D (or A)	A (or D)	D → A	A → D	example
		Spin $^1/_2$ Systems		
s^1	s^1	AF	AF	[TMPD][TCNQ],[c] [TTF][Pt(S$_2$C$_4$F$_6$)$_2$],[d] V(C$_6$H$_6$)$_2$,[e] [Cr(C$_6$H$_6$)$_2$]^V
d^1	s^1	AF	FO	$[Ni^{III}(C_5Me_5)_2]^{+\cdot}[TCNE]^{-\cdot}$[24]
d^3	s^1	FO	AF	$[Fe^{III}(C_5Me_5)_2]^{+\cdot}[TCNE]^{-\cdot}$[1a,6]
t^1	s^1	AF	FO	
t^5	s^1	FO	AF	
d^1	d^1	FO	FO	$Co^{II}(C_5H_5)^*$,[19] NO^*[18]
d^3	d^1	AF	AF	
t^1	d^1	FO	FO	
t^5	d^1	AF	AF	
d^3	d^3	FO	FO	$[Fe^{III}(C_5Me_5)_2]^{+\cdot}[BF_4]^-$[24]
t^1	d^3	AF	AF	
t^5	d^3	FO	FO	
t^1	t^1	FO	FO	
t^5	t^1	AF	AF	
t^5	t^5	FO	FO	
		Spin 1 Systems		
d^2	d^2	AF	AF	O_2,[21] $[Ru(OEP)]_2$[22a]
d^2	t^2	FO	AF	
d^2	t^4	AF	FO	
t^2	t^2	FO	FO	
t^2	t^4	AF	AF	
t^4	t^4	FO	FO	
		Spin $^3/_2$ Systems		
t^3	t^3	AF	AF	$V(C_5H_5)_2$*[23b]
		Spin 2 Systems		
q^4	q^4	AF	AF	
		Spin $^5/_2$ Systems		
p^5	p^5	AF	AF	$Mn^{II}(C_5H_5)_2$[23a]

[a] AF refers to antiferromagnetic coupling and FO to ferromagnetic coupling. [b] POMO orbital degeneracy (intrinsic or accidental): s = singly (a or b), d = doubly (e), t = triply (t), q = quadruply, or p = quintuply. [c] Ohmasa, M.; Kinoshita, M.; Sano, M.; Akamatu, H. *Bull. Chem. Soc. Jpn.* **1968**, *41*, 1998. [d] Bray, J. W.; Interrante, L. V.; Jacobs, I. S.; Bonner, J. C. *Extended Linear Chain Compounds*; Miller, J. S., Ed.; Plenum Publishing Corporation: **1983**; Vol. 3, pp 353–415. [e] Fischer, E. O.; Joos, G.; Meer, W. *Z. Naturforsch., B: Anorg. Chem., Org. Chem., Biochem., Biophys., Biol.* **1958**, *13B*, 456–457. [f] Karimov, Yu. S.; Chibrikin, V. M.; Shchegolev, I. F. *J. Chem. Phys. Sol.* **1963**, *24*, 1683–1685.

Table II. Magnetic Coupling for Heterospin Systems[9,12,a,b]

D (or A)	A (or D)	D → A	A → D	example
		Spin $^1/_2$–1 Systems		
s^1	d^2	FI	FI	
s^1	t^2	FO	FI	
s^1	t^4	FI	FO	
d^1	d^2	FI	FO	
d^1	t^2	FO	FO	
d^1	t^4	FI	FI	
d^3	d^2	FO	FI	
d^3	t^2	FI	FI	
d^3	t^4	FO	FO	
t^1	d^2	FI	FO	
t^1	t^2	FO	FO	
t^1	t^4	FI	FI	
t^5	d^2	FO	FI	
t^5	t^2	FI	FI	
t^5	t^4	FO	FO	
		Spin $^1/_2$–$^3/_2$ Systems		
s^1	t^3	FI	FI	$[Cr^{III}(C_5Me_5)_2]^{+\cdot}[TCNE]^{-\cdot}$[24]
d^1	t^3	FI	FO	
d^3	t^3	FO	FI	
t^1	t^3	FI	FO	
t^5	t^3	FO	FI	
		Spin 1–$^3/_2$ Systems		
d^2	t^3	FI	FI	
t^2	t^3	FI	FO	
t^4	t^3	FO	FI	

[a] Since $S_D \neq S_A$, FI refers to ferrimagnetic coupling and FO to ferromagnetic coupling. [b] POMO orbital degeneracy (intrinsic or accidental): s =